



THE JOURNAL
OF
The Department of Agriculture
OF
VICTORIA.

Vol. XVII. Part 5.

10th May, 1919.

GOVERNMENT CERTIFICATION OF STALLIONS.

TWELFTH ANNUAL REPORT (SEASON 1918-1919).

By W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.

When reference was made in my last annual report to the slump in the price of horses and to the future prospects, it was not thought that values would depreciate to the extent to which they did during the past season, when horses were sold at a price which certainly did not pay for the rearing, nor was it anticipated that the pendulum would commence to swing back so rapidly. The primary cause of the depression having ceased to operate, the outlook for those engaged in the horse-breeding industry has become much more promising.

Gratitude at the termination of the war now fills the hearts of all, and, with the vista of normal times ahead, more attention will be devoted to pre-war occupations. Not the least of these will be horse breeding. The low prices for horses ruling during the past twelve months and over was certainly disheartening, but during the latter months a decided improvement was evidenced. There is no reason to anticipate that this improvement will not be permanent, rather is it to be expected that it will steadily continue. During the past four years breeding operations have been considerably curtailed, and it must be remembered that the young horses sold last season were the result of matings before the curtailment. Consequently, for some years to come, the young horses available for distribution will be below normal requirements.

If carefully considered, the low market values will be seen to be the natural corollary, accentuated by the uncertain conditions due to war, of the high prices of 1908-9, when breeding was commenced in an indiscriminate manner, in the hope of sharing in the high values then ruling.

As the visible supply of young horses for the next few years is below requirements, a steady hardening of prices is bound to occur, and breeders will once more turn their attention to this avenue of production. They will, however, be well advised to reflect that the result of the coming season's matings will not be marketable for four years, so that if a

wild and misdirected rush to participate in good prices is made, and breeding from or by inferior horses is practised, such as occurred in the previous boom, the result will be a glut, and consequent drop in value. This will first be noticed in the inferior sorts, for horses of good quality will always command fair value. This was observable even during the past season, good types realizing a price which, if not profitable, did not carry the loss that occurred with poorer types. Therefore those who decide to again pay attention to horse raising should remember that the breeding of the best is the only sound proposition in this as in all other farming, whilst the worse is merely gambling, and, though with it a chance success may be secured, loss is bound to occur eventually.

In order to help the breeder to some extent, the Government certification of stallions was introduced, and horses not holding such certificates should be passed by, notwithstanding the temptation of low fees which is offered. When the Bill for the licensing of stallions becomes law, it will be of inestimable value to breeders, for the removal of the non-certificated horse is essential to the attainment of best results. The present time, when the number of unsound stallions is small, and their value small, is opportune for the application of the measure, at the minimum inconvenience to stallion owners. A cause of much dissatisfaction will be removed when the Bill is passed, for with the cheap competition of local non-certificated horses, breeders often do not avail themselves of the services of superior travelling stallions, whose progeny would make for all-round improvement.

EXAMINATIONS AND REJECTIONS.

During the past year, 116 parades were arranged for, but these were eventually reduced to 88. This was done with the kindly assistance of secretaries of agricultural societies and horse-owners, who, appreciating the difficulties arising from a short staff of examining officers available, made arrangements to take horses, if few in number, to distant or more central parades, or, if it were likely that no horses were coming forward, cancelled the parade altogether.

For the coming season, the forbearance of breeders and assistance of all concerned is again asked. By next year it is expected that the full staff will have returned to duty, and normal conditions will prevail.

At the 88 parades held a total of 267 stallions was submitted to examination, and 38, or 14.5 per cent., were rejected on account of the presence of one or other of the scheduled hereditary unsoundnesses, whilst 58, or 22.14 per cent., were rejected as being below a suitable standard. The number examined was an increase of 30 over the previous season. The rejections on account of unsoundness show an increase over those of the previous year. This increase is due to the greater number of light horses being rejected, 14.66 per cent. being unsound as against 3.57 per cent. in 1917. As previously pointed out, the variation in the percentage rejected from year to year can only be regarded from a broad aspect, and no hard and fast deductions can be made, for when the total number is small it requires very few rejections to make a big percentage variation. Further, the disability of being unable to put the unsound sire out of commission and allowing him to beget progeny for future rejection detracts very considerably from the value of the annual figures. When the Bill which has been drafted for the licensing of stallions becomes law, this

cause of a number of unsound horses coming forward for examination will be eliminated.

The unsoundness, sidebone, as in previous years, is responsible for the majority of rejections in draught horses. This defect showed an increase last season from 9.9 per cent. to 16.5 per cent. Ringbone was not recorded in any of the draughts, but four out of the seventy-five light horses examined were so affected. No light horse suffering from ringbone was noticed in 1917.

The following table gives the details of examinations of all horses. The number rejected under the heading "disapproved" shows a slight fall from 27 per cent. to 22 per cent., while the total number rejected under all headings was 96 or 36 per cent., as against 83 or 35 per cent. in 1917:—

	Draughts.		Lights.		Ponies.		Total.	
	Examined.	Certified.	Examined.	Certified.	Examined.	Certified.	Examined.	Certified.
	151	97	75	44	30	25	262	166
	Rejected.	Per cent. Rejected.	Rejected.	Per cent. Rejected.	Rejected.	Per cent. Rejected.	Rejected.	Per cent. Rejected.
Bog Spavin	2	1.32	...	...	...	...	2	.76
Bone Spavin	...	...	3	4.00	...	...	3	1.14
Curb	...	...	3	4.00	...	...	3	1.14
Ringbone	...	...	4	5.33	...	...	4	1.53
Sidebone	25	16.56	...	...	...	...	25	9.54
Stringhalt	...	...	1	1.33	...	...	1	.38
Through unsoundness	27	17.88	11	14.66	...	...	38	14.50
Through disapproval	27	17.88	20	26.67	11	30.55	58	22.14
Total rejected	54	35.76	31	41.33	11	30.55	96	36.64

RE-EXAMINATION.

Seventy-one horses which held certificates issued at previous examination were re-submitted for renewal of certificate. Eighteen were refused, eight on the ground of disapproval, and ten for having developed unsoundness. The analysis showing the result of the examination is as follows:—

HORSES SUBMITTED FOR RENEWAL OF CERTIFICATES.

Reason for Rejection.	3 years.		4 years.		5 years.		Totals.	
	Examined.	Certified.	Examined.	Certified.	Examined.	Certified.	Examined.	Certified.
	1	1	21	17	49	35	71	53
	Rejected.	Per cent. Rejected.	Rejected.	Per cent. Rejected.	Rejected.	Per cent. Rejected.	Rejected.	Per cent. Rejected.
Disapproval	1	4.76	7	14.29	8	11.27
Sidebone	2	9.52	7	14.29	9	12.68
Bog Spavin	1	4.76	..	..	1	1.41
Total	4	19.04	14	28.58	18	25.35

An increase in percentage rejections is here noted, last season the figures being 15.38 per cent. for 4-year-olds, 20.0 per cent. for 5-year-olds, and a total of 18.18 per cent. for all ages.

TRANSFERRED CERTIFICATES.

The following shows the number of certificates presented for transfer to Victorian certificates:—

New Zealand	...	...	...	...	15
New South Wales	...	...	...	...	2
South Australia	...	...	...	...	1
Tasmania	...	...	...	...	1
Total	...	...	...	...	19

EXAMINATION OF MARES.

As in the previous year, the examination of those mares which are entered in stud-books was continued, and 24 were presented. Of these, six were found to be unsound, five from sidebone and one from ringbone—a total of 33.33 per cent.

Only those mares which are entered in, or are eligible for entry in, a stud-book are permitted to come forward for examination, and owners would save themselves, the veterinary officers and clerical staff much trouble if they would strictly abide by this regulation. Notification as to the result of the examination is not given until evidence is produced that the mare is eligible. If this is not forthcoming, no information whatever is given; so that it is useless for owners to bring such mares to parades.

APPEALS.

Only one appeal was lodged during the season, and this was in respect of a light horse which was refused certification on the ground of disapproval. The Board upheld the appeal, and issued a certificate.

The work of the respective veterinary officers is shown as follows:—

Name of Examiner.	Number Examined.	Number Certificated.	Number Rejected.	Percentage Rejected.
Mr. R. N. Johnstone, B.V.Sc.	102	64	38	37.25
Mr. W. M. Lerew, G.M.V.C.	89	47	33	41.25
Mr. R. Griffin, M.R.C.V.S.	79	54	25	31.6
Appeal Board	1	1	..	..

A summary of the twelve years' work is given on page 261.

Season.	BAYANETS.			LIONS.			POSTES.			TOTALS.		
	Examined.	Certified.	Rejected.	Percentage.	Examined.	Certified.	Rejected.	Percentage.	Examined.	Certified.	Rejected.	Percentage.
1907-8 1908-9 1909-10	1314	587	Unsound Disapproved 98	27.04 7.20	787	635	Unsound Disapproved 78	9.28 10.04	569	457	Unsound Disapproved 92	16.17
1910-11	542	387	Unsound Disapproved 38	32.50 7.01	143	108	Unsound Disapproved 20	19.31 14.08	813	506	Unsound Disapproved 128	15.88
1911-12	692	554	Unsound Disapproved 54	28.58 7.8	166	120	Unsound Disapproved 13	24.61 10.87	970	758	Unsound Disapproved 192	19.90
1912-13	745	607	Unsound Disapproved 59	12.03 7.92	139	106	Unsound Disapproved 11	7.87 10.07	951	746	Unsound Disapproved 105	11.15
1913-14	718	507	Unsound Disapproved 132	11.0 18.38	157	102	Unsound Disapproved 38	23.74 24.84	963	669	Unsound Disapproved 294	30.53
1914-15	400	267	Unsound Disapproved 17	20.30 4.25	121	75	Unsound Disapproved 14	11.57 17.73	693	397	Unsound Disapproved 296	42.76
1915-16	239	144	Unsound Disapproved 48	33.25 20.08	71	48	Unsound Disapproved 18	25.35 25.35	355	220	Unsound Disapproved 135	38.03
1916-17	186	106	Unsound Disapproved 41	16.19 21.81	79	40	Unsound Disapproved 30	3.80 45.57	320	185	Unsound Disapproved 135	41.51
1917-18	121	82	Unsound Disapproved 25	11.57 20.66	84	52	Unsound Disapproved 30	3.57 34.52	237	154	Unsound Disapproved 83	35.02
1918-19	151	97	Unsound Disapproved 27	17.88 17.88	75	44	Unsound Disapproved 20	26.67 26.67	262	166	Unsound Disapproved 96	36.64
				54.33-76			31	41.33				

SUPPLEMENTARY LIST OF LIFE CERTIFICATED STALLIONS.

Cert. No.	Name of Horse.	Age.	Owner.	Parade.	Date of Examination.	Officer.
DRAUGHTS.						
3106	Advance ..	7 years	R. Heywood ..	Kerang ..	7.8.18	R.N.J.
3150	Baron Abbot ..	6 years	P. McDonald ..	Sea Lake ..	23.8.18	W.M.L.
3117	Baron Asquith ..	5 years	J. H. Meyer ..	Kaniva ..	13.8.18	R.G.
3089	Baron Fenwick ..	5 years	A. J. Richards ..	Royal Show Grounds	22.7.18	R.N.J.
3093	Baron's Royal Chief ..	5 years	T. E. Parry ..	St. Arnaud ..	29.7.18	R.N.J.
3097	Baron Stanley ..	5 years	W. M. Rowan ..	Kyneton Special ..	29.7.18	R.G.
3122	Belmain ..	5 years	L. McLeod ..	Tatura ..	14.8.18	W.M.L.
3084	Bold Newton ..	5 years	J. R. Mitchell ..	Casterton ..	16.7.18	R.N.J.
3104	Bonnie Belmont ..	6 years	W. Williams ..	Strathmerton ..	7.8.18	R.G.
3079	Calland Dale (Imp.) ..	5 years	J. E. Hooper ..	Newmarket Special ..	13.7.18	R.G.
3123	Claymore ..	5 years	Cullen and Hiskens ..	Rutherford ..	16.8.18	W.M.L.
3030	Everest Dale (Imp.) ..	Aged	E. J. Riekey ..	Newmarket Special ..	13.7.18	R.G.
3090	Everest Lad ..	5 years	A. Arnold ..	Royal Show Grounds	22.7.18	R.N.J.
3081	Fitzallan (Imp.) ..	5 years	Gillies and Walter ..	Newmarket Special ..	13.7.18	R.G.
3105	Gisborne ..	5 years	W. L. Millstead ..	Hopeforn ..	6.8.18	W.M.L.
3074	Gordon Dale (Imp.) ..	5 years	E. Roberts ..	Newmarket Special ..	3.4.18	W.M.L.
3129	High Commander ..	5 years	Mitchell and O'Brien ..	Euroa ..	22.8.18	R.N.J.
3150	Hillhead Knight ..	5 years	W. Black ..	Royal Show ..	23.9.18	R.G.
3091	Irwell Hero ..	5 years	A. Dunning ..	Royal Show Grounds	23.7.18	R.N.J.
3110	Jim O'Connell ..	Aged	King Bros. ..	Beulah ..	8.8.18	W.M.L.
3092	Just-in-Time ..	5 years	Geo. Stokes ..	Royal Show Grounds	22.7.18	R.N.J.
3118	King of Ury Park ..	5 years	W. Hicks ..	Kaniva ..	13.8.18	R.G.
3136	Lee Creek Favourite ..	5 years	Ewart Bros. ..	Marchison ..	30.8.18	R.N.J.
3087	Lord Everest ..	7 years	Oldham and White ..	Hamilton ..	18.7.18	R.N.J.
3103	Lord Ronald ..	5 years	E. Allan ..	New Zealand Exam. ..	12.6.18	W.M.L.
3124	Loyalist ..	Aged	O. Gray ..	Korong Vale ..	19.8.18	W.M.L.
3155	Magician ..	5 years	W. J. Williams ..	Korumburra ..	4.10.18	W.M.L.
3128	Major Dale ..	5 years	P. J. Edwards ..	Charlton ..	21.8.18	W.M.L.
3114	Mora Lyon ..	6 years	J. C. Pepper ..	Murtoa ..	9.8.18	W.M.L.
3100	Ormond Dale ..	5 years	Letcher Bros. ..	Donald ..	30.7.18	R.N.J.
3082	Pettadale (Imp.) ..	5 years	N. Ramsay ..	Newmarket Special ..	13.7.18	R.G.
3135	Prince Coupar ..	5 years	J. Archibald ..	Nathalia ..	23.8.18	R.N.J.
3161	Referendum ..	Aged	J. F. Farrer ..	Colac Special ..	22.11.18	W.M.L.
3138	Royal Douglas ..	5 years	T. Thornton ..	Waiata ..	23.8.18	R.N.J.
3125	Royal Robin ..	5 years	J. Boyle ..	Boort ..	20.8.18	W.M.L.
3119	Royal Willie ..	5 years	F. W. Sallman ..	Nhill ..	11.8.18	R.G.
3111	St. Mark ..	5 years	F. W. Marshman ..	Beulah ..	8.8.18	W.M.L.
3083	Square Dale (Imp.) ..	5 years	Geo. Stokes ..	Newmarket Special ..	13.7.18	R.G.
...	The Monk ..	5 years	Executors of J. D. Ormond Estate ..	Queensland Exam. ..	9.8.18	...
3077	The Standard ..	5 years	G. W. Pickford ..	Horsham ..	10.7.18	R.N.J.
3093	Vanguard ..	5 years	G. and W. Lord ..	Royal Show Grounds	23.7.18	W.M.L.
3101	Widgieva Fancy ..	5 years	W. J. Sprout ..	Donald ..	30.7.18	R.N.J.

THOROUGHBRED.

3131	Caledon ..	Aged	A. Jacobs ..	Swan Hill ..	6.8.18	R.N.J.
3149	Erin's Bard ..	Aged	E. O'Connell ..	Royal Show ..	23.9.18	R.N.J.
3136	Happy Vein ..	Aged	Fitzpatrick Bros. ..	Quambatook ..	20.8.18	W.M.L.
3120	Lord Antony ..	Aged	J. J. Britt ..	Jeparit ..	13.8.18	R.G.
3152	Maltage ..	Aged	K. A. Underwood ..	Royal Show ..	23.9.18	W.M.L.
3109	Meekawash ..	Aged	J. L. Vallence ..	Cohuna ..	8.8.18	R.N.J.
3154	Several ..	5 years	J. Boyd ..	Royal Show ..	21.9.18	R.G.
3085	War Step ..	5 years	J. Jackson ..	Casterton ..	16.7.18	R.N.J.

LIGHT HORSES.

3108	Akabah ..	5 years	A. Cameron ..	Warracknabeal ..	7.8.18	W.M.L.
3095	Bonnie Voyage ..	5 years	Belmont Stud Farm ..	Bendigo ..	23.7.18	W.M.L.
3148	Celmar Chimes ..	5 years	Cochrane and Sons ..	Royal Show ..	23.9.18	R.N.J.
3096	Dan Patch Junior ..	5 years	J. McCormick ..	Bendigo ..	23.7.18	W.M.L.
3113	Demo Dick ..	5 years	Nuske Bros. ..	Murtoa ..	9.8.18	W.M.L.
3127	Duke of Melton ..	Aged	Hoysted Bros. ..	Wangaratta ..	22.8.18	R.N.J.

SUPPLEMENTARY LIST OF LIFE CERTIFICATED STALLIONS—continued.

Cert. No.	Name of Horse.	Age.	Owner.	Parade.	Date of Examination.	Officer.
LIGHT HORSES—continued.						
3139	Eltham ..	7 years	Mrs. C. Barr ..	Maryborough ..	3.9.18	R.N.J.
3192	Flash Donald ..	5 years	Jas. Morris ..	Birchip ..	30.7.18	R.G.
3159	Flash Dillon ..	5 years	J. S. Ford ..	Paechnis Marsh ..	28.10.18	R.G.
3160	Gold Tuck ..	5 years	J. G. Barnes ..	..	..	Appeal Board
3157	Hambletonian Direct ..	5 years	R. J. Wright ..	Bendigo ..	8-10-18	W.M.L.
3116	Harry Rose ..	7 years	R. Hunter ..	Elmore ..	9-8-18	R.N.J.
3131	Harvest Again ..	6 years	W. J. Clarke ..	Ouyen ..	1.8.18	R.G.
3086	Light o Frisco ..	7 years	P. Hendrick ..	Hamilton ..	18.7.18	R.N.J.
3094	Master Patchem ..	Agent	M. Coffey ..	Public Offices ..	27.7.18	R.G.
3137	Seldom ..	Aged	F. W. Barry ..	Murchison ..	30.8.18	R.N.J.
3146	Silver King ..	Aged	D. A. Hopkins ..	Salc Special ..	11.9.18	R.G.
3149	The Retainer ..	7 years	Jas. McVicar ..	Maryborough ..	3.9.18	R.N.J.
3143	Welcome Abbey ..	7 years	W. Haynes ..	Pallarat ..	6.9.18	R.G.
3111	Young Yeltesco ..	5 years	M. Ford, Junr. ..	Maryborough ..	3.9.18	R.N.J.
PONIES.						
3147	Bonny Doon ..	5 years	J. Gardner ..	Royal Show ..	23.9.18	R.N.J.
3076	Carwelkin ..	Aged	T. Spillane ..	Public Offices ..	2.7.18	R.G.
3133	Champion Wizard ..	5 years	D. Guthrie ..	Coltran ..	27.8.18	R.N.J.
3078	Dandy Shine ..	5 years	E. Boddington ..	Public Offices ..	19.7.18	R.N.J.
3115	Director ..	5 years	Quinn Bros. ..	Elmore ..	9.8.18	R.N.J.
3144	Golden Locke ..	7 years	Executors J. James ..	Colac ..	2.9.18	R.G.
3099	Little Welshman ..	5 years	C. Bourke ..	Donald ..	30.7.18	R.N.J.
3131	Maldon ..	Aged	J. E. Sze ..	Royal Show ..	21.9.18	R.N.J.
3153	Master Boy ..	Aged	T. Sauster ..	Royal Show ..	21.9.18	R.G.
3088	Prince Harold ..	6 years	H. Robertson ..	Hamilton ..	18.7.18	R.N.J.
3132	Satellite Junior ..	Aged	Wm. Church ..	Dookie ..	26.8.18	R.N.J.
3145	Thoughtful ..	6 years	P. McIntosh ..	Colac ..	2.9.18	R.G.
3112	Young Radawoon ..	5 years	T. Morley ..	Beulah ..	7.8.18	W.M.L.
3126	Young Comet ..	5 years	T. Atkey ..	Korumburra ..	4.10.18	W.M.L.
3153	Young Lowrie ..	5 years	R. McPherson ..	Broadford Special ..	15.10.18	R.N.J.

LIST OF TERMINABLE CERTIFICATED STALLIONS.

(Four-year-old Certificates expiring 30th June, 1919.)

Cert. No.	Name of Horse.	Owner.	Parade.	Date of Examination.	Officer.
DRAUGHTS.					
1206/4	Baron Juno ..	W. T. Manifold ..	Campertown ..	3.9.18	R.G.
1215/4	Baron Lee ..	Meer Khan ..	Royal Show ..	23.9.18	R.N.J.
1211/4	Blacon ..	R. Stockdale ..	Warragul ..	12.9.18	R.G.
1188/4	Bold Azitation ..	W. Cumming ..	Denalla ..	1.8.18	W.M.L.
1189/4	Bonnie Brue ..	King Bros. ..	Birchip ..	30.7.18	R.G.
1197/4	Brestknot ..	W. J. Mol ..	Dumboola ..	16.8.18	R.G.
1198/4	Bute Liddle ..	Crawford Bros. ..	Tatura ..	14.8.18	W.M.L.
1220/4	Glengarnock ..	B. Mackenzie ..	Bass ..	24.10.18	W.M.L.
1199/4	Grand March ..	H. Carr ..	Charlton ..	21.8.18	W.M.L.
1192/4	Ian McClelland ..	H. Naylor ..	Beulah ..	8.8.18	W.M.L.
1201/4	Kilbourn ..	Dookie Agricultural College ..	Dookie ..	26.8.18	R.N.J.
1198/4	Marshal Clyde ..	R. Thomas ..	Beulah ..	8.8.18	W.M.L.
1195/4	Nailstone Fanoy ..	J. P. Manning ..	Nhill ..	14.8.18	R.G.
1210/4	Roving Willie ..	J. McGregor ..	South Australian Exam. ..	17.7.18	R.G.
1196/4	Royal Success ..	H. E. Dahenberg ..	Nhill ..	14.8.18	R.G.

LIST OF TERMINABLE CERTIFICATED STALLIONS—*continued.*

Cert. No.	Name of Horse.	Owner	Parade.	Date of Examination.	Officer
DRAUGHTS—continued.					
1183/4	Scotch Blair	Geo. Stokes	Royal Show Grounds	22.7.18	W.M.L.
1219/4	Seymour	J. B. Cleland	Bass	24.10.18	W.M.L.
1191/4	Sir Douglas Haig	J. Biddlecombe	Public Offices	3.8.18	R.G.
1187/4	Solomon Prince	G. Esler	Narrawong	30.7.18	W.M.L.
1203/4	Standard Bearer	T. Thornton	Waaia	28.8.18	R.N.J.
1184/4	Trelawney Marguis	G. Neild	Royal Show Grounds	23.7.18	R.G.
1181/4	Wigton Again	A. and J. H. Young	Horsham	10.7.18	R.N.J.
1182/4	Wimmera Ranger	T. Mibus	Hamilton	18.7.18	R.N.J.
1189/4	Young Middlemarch	F. J. O'Donnell	St. Arnaud	29.7.18	R.N.J.

LIGHT HORSES.

1194/4	All Black	J. Marks	Elmore	9.8.18	R.N.J.
1180/4	Ashville Lad	G. Inglis	Tongala Special	11.4.18	R.N.J.
1202/4	Jack	I. Tyers	Nunmurrah	28.8.18	R.N.J.
1185/4	Latest Fashion	T. O. Hunter	Bendigo	25.7.18	W.M.L.
1213/4	Royal Guinea	J. Pretty	Warragul	12.9.18	R.G.

PONIES.

1200/4	Bonnie Wizard	W. Morey	Doonik	26.8.18	R.N.J.
1214/4	Dandy Boy	W. Horn	Ararat	17.9.18	W.M.L.
1216/4	Glencarry	A. B. Dalton	Royal Show	22.9.18	W.M.L.
1209/4	Lord Billy	G. Smith	Warrnambool	4.9.18	R.G.
	Lord Milton	Miss T. Doyle	South Australian Exam.	10.9.18	
1207/4	Saint Rube	G. S. Clarke	Camperdown	3.9.18	R.G.
1205/4	The Clerk	C. R. Foster	Geelong Special Exam.	2.9.18	R.G.
1190/4	True Shot	Leitch Bros.	Donald	30.7.18	R.N.J.
1208/4	Young Bally	M. Gribbin	Camperdown	3.9.18	R.G.
1217/4	Young Cymro B'ch	A. B. Anderson	Korumburra	4.10.18	W.M.L.
1221/4	Young Reeruit	A. E. Osborne	Camperdown Special Exam.	12.11.18	R.G.

(Three-year-old Certificates expiring 30th June, 1919.)

DRAUGHTS.

1876/3	Baron Faithful	D. Barry, Jr.	Tatura	14.8.18	W.M.L.
1388/3	Baron Superior	H. A. Ford	Trafalgar Special	4.11.18	R.G.
1879/3	Bonnie Lawrence	R. H. B. Guest	Ararat	17.9.18	W.M.L.
1864/3	Bonnie Scotland	S. L. West	Public Offices	27.7.18	R.G.
1874/3	Buchanan's Fancy	Allen and Sons	Null	14.8.18	R.G.
1889/3	Clowrdale	C. McPherson	Bungaree Special	7.11.18	R.G.
1880/3	Craigville of Bolobek	Gillies and Walter	Royal Show	23.9.18	R.N.J.
1875/3	King Albert	T. Parker	Jeparit	13.8.18	R.G.
1872/3	Kine Clyde	T. O'Brien	Hopetoun	6.8.18	W.M.L.
1857/3	Longbeach Record	Mitchell and O'Brien	Horsham	10.7.18	R.G.
1860/3	Lord Bute	Gillies and Walter	Royal Show Grounds	23.7.18	R.N.J.
1855/3	Majestic	Robinson and Vincent	Dean Special	28.6.18	R.N.J.
1861/3	Morocco Lad	A. Arnold	Royal Show Grounds	23.7.18	R.G.
1877/3	Premier's Fancy	Mitchell Bros.	Tatura	11.8.18	W.M.L.
1854/3	Pride of Crookston	J. W. Blair	New Zealand Exam.	12.4.18	
1856/3	Royal Simon	Mitchell and O'Brien	Horsham	10.7.18	R.G.
1858/3	Royal Standard	G. Stokes	Horsham	10.7.18	R.N.J.
1878/3	Royal Style	J. Starrock	Ararat	17.9.18	W.M.L.
1862/3	Scotland's Knight	J. Elliott	Royal Show Grounds	23.7.18	R.G.
1868/3	Sportsman's Hero	J. P. Belleville	Watchem	30.7.18	R.N.J.
1869/3	Sportsman's Model	V. S. Belleville	Watchem	30.7.18	R.N.J.
1871/3	Stockman's Lad	Perkins Bros.	Ouyen	1.8.17	R.G.
1863/3	Trelawney Again	Dyke Bros.	Royal Show Grounds	23.7.18	R.G.
1885/3	Trelawney Time	A. Colvin	Kirk's Bazaar Special	27.9.18	R.G.
1870/3	Walden Prince	Bunworth Bros.	Donald	30.7.18	R.N.J.

LIGHT HORSES.

1881/3	Fashion Plate	J. Sichel	Royal Show	21.9.18	W.M.L.
1887/3	Great Style	F. E. Deehan	Bendigo Special	8.10.18	W.M.L.
1867/3	Guy Todd	W. Williams	St. Arnaud	29.7.18	R.N.J.
1866/3	Jack Style	P. Whitechurch	Mildura	31.7.18	R.G.
1873/3	Kola Mauritius	J. A. Wilson	Kerang	7.8.18	R.N.J.
1883/3	O.V.E.	A. Bunting	Royal Show	21.9.18	R.G.
1886/3	Royal Silver	J. Hahsey	Leonatha	3.10.18	W.M.L.
1865/3	Wingrave Style	W. Manning	Bendigo	23.7.18	W.M.L.

LIST OF TERMINABLE CERTIFICATED STALLIONS—continued.

Cert. No.	Name of Horse.	Owner.	Parade.	Date of Examination.	Officer
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PONIES.

1882/3 Griff Bangor .. Mrs. J. MacLellan .. Royal Show .. 23.9.18 W.M.L.

(Two-year-old Certificates expiring 30th June, 1919.)

DRAUGHTS.

282/2	Baron Alexander	.. Mitchell and O'Brien	New Zealand Exam. ..	12.4.18	..
268/2	Baron Roseberry	.. C. E. Parsons	New Zealand Exam. ..	12.4.18	..
271/2	Baron's Crown	.. J. W. Blair	New Zealand Exam. ..	12.4.18	..
273/2	Baron Stewart	.. J. W. Hansen	New Zealand Exam. ..	12.4.18	..
266/2	Black Tom	.. A. and J. H. Young	Horsham ..	10.7.18	R.N.J.
293/2	Captain Stewart	.. D. L. Boley	Horsham ..	10.7.18	R.G.
274/2	Douglas Chief	.. F. W. Sullivan	New Zealand Exam. ..	12.6.18	..
275/2	Gallant Douglas	.. J. Burns	New Zealand Exam. ..	12.6.18	..
261/2	General Mark	.. J. W. Blair	New Zealand Exam. ..	12.4.18	..
267/2	Glen Lomond Lad	.. H. P. Searle	Royal Show Grounds ..	22.7.18	R.N.J.
270/2	High Degree	.. J. Galloway	New Zealand Exam. ..	12.4.18	..
272/2	High Honour	.. C. H. Feldmann	New Zealand Exam. ..	12.4.18	..
278/2	King Ballance	.. F. Kennett	Kaniva ..	13.8.18	R.G.
269/2	Newton Bold	.. Gerrard Bros.	New Zealand Exam. ..	12.4.18	..
262/2	Pride of Clutha	.. J. H. Cornfoot	New Zealand Exam. ..	12.4.18	..
264/2	Ranger Style	.. D. L. Boley	Horsham ..	10.7.18	R.G.
260/2	Scotland's Peer	.. J. R. and H. J. Manson	New Zealand Exam. ..	12.4.18	..
276/2	Sportsman Hero	.. H. Reid	Birchip ..	30.9.18	R.G.
280/2	Willie Again	.. J. Hicks	Nhill ..	14.8.18	R.G.
265/2	Wrought Iron	.. A. and J. H. Young	Horsham ..	10.7.18	R.N.J.
281/2	Young Edward	.. D. Hichens	Wangarua ..	22.8.18	R.N.J.
279/2	Young Major	.. McDougall Bros.	Kaniva ..	13.8.18	R.G.

PONIES.

277/2	Dandy Jim	.. H. Daniel	.. Hopetoun ..	6.8.18	W.M.R.
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LOLIUM SUBULATUM, VIS., "WIMMERA" RYE-GRASS.

A Hardy Species of Rye-Grass Hitherto Unrecorded in Victoria, and of Great Promise for Sowing of Pastures in the Wheat Belt—if Controllable.

By H. A. Mullett, B.Ag.Sc., Science Field Officer.

INCREASING THE SHEEP-CARRYING CAPACITY OF LAND IN THE WHEAT BELT.

During the present era of high prices for wool and mutton it should not be difficult to interest the farmers of the wheat belt of this and other southern States in any feasible method of materially increasing the stock-carrying capacity of their resting arable lands. Over 4,000,000 sheep are now carried in the wheat belt of Victoria. They represent one-third of the total number of sheep in the State. The value of the wool alone shorn from these sheep amounts annually to several millions sterling; the value of the mutton is also considerable. The returns from sheep now figure so largely on the average wheat farm that to increase the number of sheep carried to the acre is the keen desire of every farmer.

One of the ways in which this might be done, if a suitable plant were available, would be to replace the present natural grass and wild-oat pastures in the usual rotation systems practised, viz., fallow, wheat, oats, followed by pasture, or alternatively fallow, wheat, and then pasture, with some plant of greater productivity.

Numerous plants have been tested from time to time for this purpose, but so far the best results obtained, though payable, are not of a high order. The ordinary cultivated annual grasses do not readily re-establish themselves under northern climatic conditions, and as annual crops they do not often repay the high initial cost of their establishment. Thus the sowing of Italian rye grass after cereals as a temporary pasture—a British practice—has no vogue here in the wheat belt. Again, perennial grasses such as English rye, cocksfoot, &c., and the clovers, do not survive the long dry summer.

The plant showing greatest promise, so far, is perhaps lucerne, the well-known summer-growing legume, which owes its drought resistance to its vigorous tap-root, but since its growth is dependent on summer rains, which do not materialize in three seasons out of five, it is, except in favoured sites, a doubtful success. Light sowings of King Island Mellilot (*Melilotus parviflora*)—an annual—have proved useful on the black soils of the Wimmera; but in this case the practice is more noteworthy for the low cost of the seeding than for the bulk of feed produced.

The ideal plant for temporary pastures, besides being capable of easy and cheap propagation and of fitting in generally with wheat and sheep farming, must be regularly highly productive, and, lastly, it must be controllable.

A NEW GRASS FOR TEMPORARY PASTURES.

The present writer believes that a plant which much more nearly satisfies the above conditions than any of the plants previously mentioned, including natural pastures, exists in the shape of a certain annual species of rye grass, known locally as "Italian" rye grass, which has flourished and persistently re-seeded itself on a number of typical Wimmera and Mallee farms for periods, in several cases, up to and even exceeding a quarter of a century. Strangely enough it attracted little notice during that time.

The first reference to the grass appears to be that of Mr. Temple A. J. Smith (*Journal of Agriculture*, February, 1916, p. 81), but it was not identified, nor were its possibilities and distribution fully investigated until the present survey was undertaken last year.

There have as yet been no accurate comparative tests of any sort made with the grass, but the verbal testimony so far collected is strikingly corroborative in affirming its high carrying capacity, and also in testifying to its power of re-establishing itself under the Wimmera and Mallee conditions. Indeed, one gathers that it is not this feature that has exercised the ingenuity of those cultivating it, but rather that of its control. For on this point of control the opinions of farmers who know the grass are sharply divided. The majority avers that it can be eradicated when necessary by careful fallowing, and refer to the grass in terms of the greatest enthusiasm as "the best grass ever introduced into the Wimmera." On the other hand, a few, while admitting its high feeding value, contend that to the *bonâ fide* wheat-grower it is a "curse." The evidence so far collected, however, shows that a number of growers are deriving substantial feed benefits from the grass, and, at the same time, maintaining their wheat yields at a high level.

The following is an account of an investigation into the history, present distribution in Victoria, habits, stock-carrying capacity, methods of propagation, and control of the grass referred to, so far as can be gathered by visiting existing stands of the grass, and collating the experiences of the various growers.

Seeing that large parcels of the seed have been sold on the market as Italian rye-grass, and that accurate experiments to test the most doubtful point, *i.e.*, the control, will take at least two seasons, it has been thought advisable to set out impartially the whole of the evidence secured, if only to fully acquaint those who may have sown or who contemplate sowing the grass of its vigorous habits. The possible value of the grass to southern districts is not treated here, because, as yet, sufficient data on this phase has not been collected.

HISTORY AND DISTRIBUTION.

The present investigation, which was undertaken after seeing near Minyip a magnificent old stand of the grass some thousands of acres in extent, demonstrated that it was well established not only at Minyip, but also in isolated patches throughout the Wimmera and older Mallee, and, further, that apparently the whole of the samples came from one original source—the farm of Mr. Reuben Light, at Noradjuha, near Horsham, many years ago.

Excellent stands of the grass were seen on the farms of the following:—H. McDougal, Messrs. Barnes and Young, N. McGilp, and others, Minyip; J. Dart, Nhill; A. W. Milbourne and others, Warracknabeal; W. McAllister and C. McLennan, Galaquil.

Information has also been received indicating that further old-established paddocks occur at other centres, including Jeparit and Noradjuha. More recently the grass has been introduced to Lara, Ballarat, Willaura, &c., where it is stated to be doing well.

The earliest record of the grass, so far, is that furnished by Mr. R. Light, who states there was an area of the grass on his farm at Noradjuha when he took possession of it 32 years ago. It had been planted there by a man named McNichol, the previous occupier, who had

brought it from Europe. The grass flourished on a paddock with heavy clay soil, and grew so vigorously that it was soon found impossible on this one particular paddock to get payable crops of wheat. Consequently it was thrown out and stocked until September each year, and then closed up for seed, then cut, and afterwards threshed with an ordinary steam thresher.

This process was repeated for four or five years only, apparently without checking the grass. Among those who secured seed from this source were Messrs. J. Dart, G. Batson, and S. E. Schnaars, of Nhill; Mr. Milbourne, senior, "Ailsa," Warracknabeal; and Mr. Franklin, Minyip. Prominent in spreading the grass was a Mr. Urbhans, a contract surveyor, who had seen it at Noradjuha, and afterwards spoke of it in terms of high enthusiasm to a number of Wimmera and Mallee farmers. Mr. Milbourne



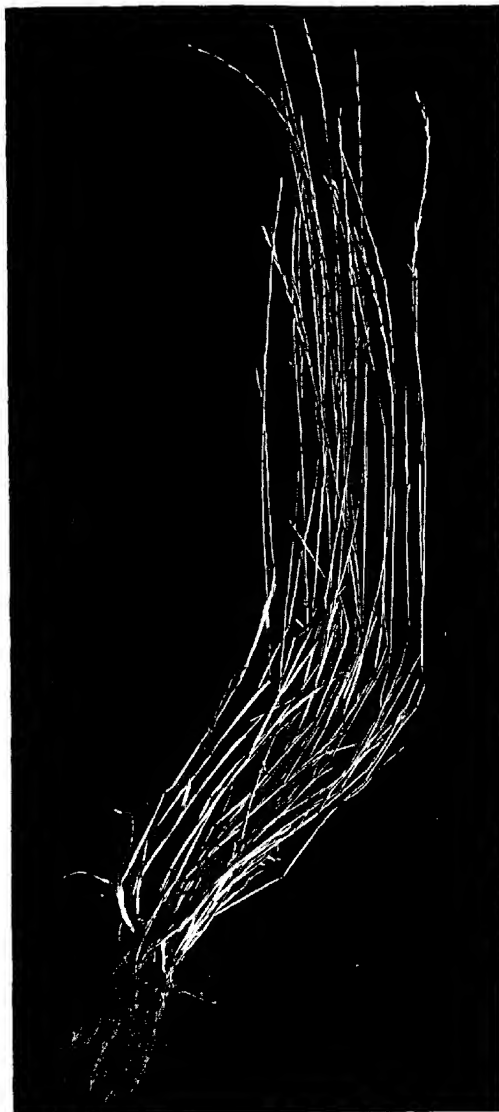
A Paddock of "Wimmera" Rye-grass at Minyip.

(Photograph taken mid-November, 1918.)

The paddock had been heavily stocked till end of August, and then closed up for seed.

secured a bag of seed, for which he paid a guinea, and which Mr. Urbhans carted overland 50 miles to him. Mr. Milbourne sowed this grass alongside a number of others he was testing, and it rapidly proved itself superior to all others tried. This was about 25 years ago. Just before the 1902 drought, Messrs. McDougal, of Minyip, obtained a bag of "perennial" rye-grass seed from a Melbourne seed merchant, but, although it is an annual, and resembles the Noradjuha samples, its original source is so far indefinite. Very probably it came from Noradjuha.

The spread of these original sowings has been in some cases phenomenal. For instance, at Messrs. McDougal's, from the original 5-acre paddock on which the grass was sown, it has now spread over at least 3,000 acres in a north-easterly direction. At "Ailsa," Warracknabeal,



Lolium subulatum—"Wimmera" Rye-grass.

The grass has a most vigorous root system, though the illustration shows but a portion



Diagram illustrating the Botanical Differences between three species of
Rye-grass.

Note the long closely-attached outer glumes and the absence of awns in the case of
the "Wimmera" rye-grass—*Lolium subulatum*.

Mr. Milbourne, senior, at first harvested the seed, and then assiduously re-sowed it, but later he found it necessary to sow it only on the west of his property—wind storms did the rest. It now covers some thousands of acres in the vicinity.

That sown by Mr. Franklin has spread over many hundreds of acres on his property, now in the possession of Messrs. Barnes and Young. In Mr. Batson's case the spread has not been great, apparently owing to the heavy stocking received by the small patch sown. It is still present, however, especially in a lucerne patch, even though it is cut repeatedly, and Mr. Batson states that of a number of grass plots put in 25 years ago, this grass and rib grass are the only ones that remain to-day.

There is evidence that the stock and domestic water channels, sheep, and cereal hay have all played their part in the further dissemination of the grass, and numbers of farmers hearing of it, obtained samples in bags of wheat screenings. But, except at Noradjuha, it was apparently not realized that seed could be easily obtained by stripping it, or by the use of mower and thresher. Apparently no extensive distribution of seed took place after Mr. Light ceased to thresh it until two years ago, when, at the suggestion of a Mr. Walters, a 140-acre paddock of the grass at McDougal's, Minyip, was closed up and part threshed and part stripped, with highly successful results. Last year almost 2,000 bushels from this source were sold as Italian rye grass to seed merchants. This year probably a similar quantity has been disposed of.

DESCRIPTION OF THE GRASS.

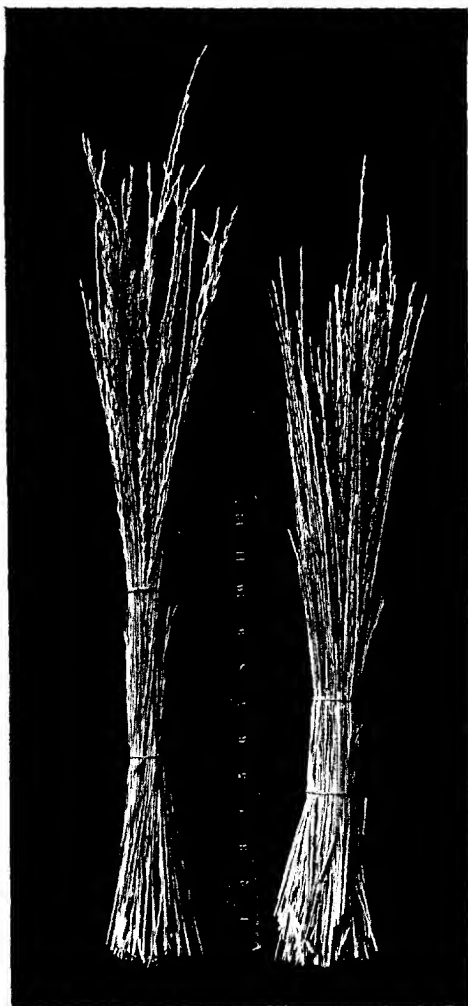
Specimens of the grass—a photo. of which accompanies the text—were provisionally identified by Professor Ewart, the Government Botanist, as *Lolium subulatum*—a species of rye grass not hitherto recorded in Victoria. Professor Hitchcock, of the United States Department of Agriculture, to whom samples were referred by Professor Ewart, has confirmed this designation.

Lolium subulatum is stated to be a native of Southern Europe, and is apparently not recorded as of any economic importance there, so that it is possible that Victorian conditions suit it better than its native habitat.

Professor Ewart points out that the grass resembles Italian rye grass in being an annual and in possessing the general characteristic of the lolium or rye-grass family. It, however, differs from Italian rye grass in that the characteristic awns attached to the flower of that variety are largely suppressed, and also in possessing a long rigid outer glume (resembling in this respect *Lolium temulentum* (Drake)), which, when the plant is mature, holds the seed tightly.

The stems of all young specimens so far examined possess the usual purplish base characteristic of rye grass. As the plant ripens, this colour extends to the whole of the stem, the effect of which is to give a very definite appearance indeed to a field of the grass at this stage of ripeness. The leaf-bud in the young plant appears to be cylindrical and rolled as in Italian rye.

The root system is fibrous and extremely vigorous, but is not persistent. The grass in the Wimmera and Mallee seeds very freely. The seed is larger and plumper than average samples of rye-grass, and is apparently capable of retaining its vitality for several years in the soil, though this point has yet to be proved. Propagation is by the seed only.



Samples of "Wimmera" Rye-grass cut for hay at Minyip last year.

The sample on the left hand was cut at the flowering stage. At this time the flowering glume is not so tightly attached as when the grass is fully ripe. A sample cut at this stage is shown on the right.

HABITS.

The grass is at home on both the black and on the red Wimmera soils, though it is stated to do better on the red clays than on the friable black soils, the yields of seed being generally several bushels heavier on the red ground than on the black.

While the heaviest growths of all are obtained in low-lying crab-hole country, the bulk of the land referred to in this article is average Wimmera and Mallee land respectively.

At Galaquil and Beulah the grass was found thriving on red Mallee loam overlying a clay subsoil, while, according to Mr. J. Dart and others, it does equally well on very light sandy Mallee soils, provided there is a clay subsoil. A case was quoted by Mr. Dart where the grass on the property of S. Schmaars, Woorack West, has arrested the progress of a drifting sandhill.

According to Mr. A. W. Milbourne, the grass in the course of a few years completely overran a large bare salt patch on his property, presumably by gradually mulching the edge of the patch, a process which would prevent further evaporation and at the same time produce a medium for the germination of the seed.

The period of growth of the grass in the Wimmera and Mallee is similar to that of the cereals. Growth starts from the seed with the first autumn rains, and in the average year the plant may be fed green from April to December, while dry feed is available during the remainder of the summer and well into the autumn months. The growth in the spring is remarkably vigorous. The grass generally flowers about the middle of October, and it evidently pollinates very freely, since it is stated that clouds of pollen may be seen rolling away from any good paddock of the grass about that time.

In an average year in the Wimmera (16-inch rainfall) the grass is stated to grow about 2 feet high, and in good years up to 3 feet. This year, on a 14-inch rainfall, it grew about 20-24 inches high.

Mr. H. McDougal, Minyip, and others make excellent hay from the grass, which, when properly cured, is stated to be preferred by horses and dairy cows to oaten or wheaten hay. As compared with cereal hay, there is an immediate response, says Mr. McDougal, in the milk yield of the dairy cows when supplied with this hay. The samples of grass hay seen at Mr. McDougal's certainly were most aromatic, and were sweet to the taste. It is important "to cut the grass just after the flowering stage, when the grass is turning colour, otherwise it will become rather hard and coarse. Besides hay, the grass makes capital ensilage. It proves tough cutting with the binder, and is best cut with a mower."

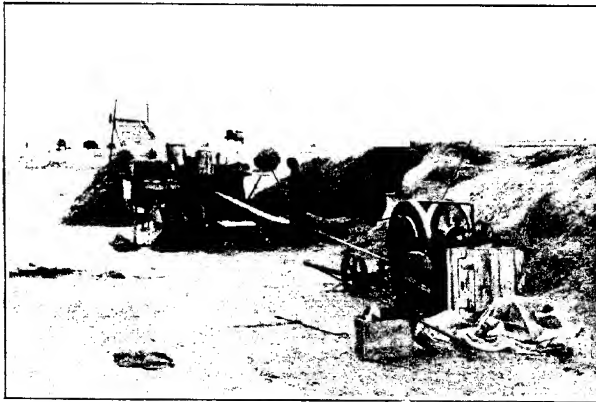
A characteristic property of the grass is to fall down shortly after it is ripe, and this, together with its propensity of firmly holding the grain, enables it, in the words of Mr. J. Dart, Nhill, "to make its own hay," a phrase which was meant to emphasize the fact that the dried layered grass is, until bleached by autumn rains, still excellent sheep feed, because the presence of the grain makes the straw both palatable and nutritious.

The capacity of the grass to seed freely under normal Wimmera conditions is most marked. For instance, in 1917, a paddock of 140 acres

at Mr. McDougal's, Minyip, after being grazed till August, was closed up and left for seed. An average yield of 15 bushels to the acre of clean dressed seed was obtained, the grass being mowed, stacked, and threshed.

Last year (14-inch rainfall) a paddock of 180 acres, comprising red and black soils, and which had been continuously down in rye-grass for years without being disturbed, was stripped with a modified stripper, and after threshing, a yield of about 12 bushels to the acre of clean dressed seed was obtained, worth this year 6s. 6d. per bushel of 20 lbs.

Some of this seed has been traced to the southern districts, where it has done well. Last year Mr. H. Gordon, of Spring Hill, Willaura, sowed 3 bushels on a piece of fallow, and reaped 66 bushels from it, *i.e.*, 22 bushels to the acre. Mr. Gordon's comments were as follows:—"It did remarkably well, though not sown till June. It did not make much growth till spring—grew long enough to cut with a binder." Mr.



Threshing out the Seed after Stripping a Paddock of 180 acres of "Wimmera" Rye-grass at Minyip last year.

Yield, 12 bushels to the acre of cleaned dressed seed.

F. S. Armstrong, of "Larmo," Broadwater, who recently bought a large quantity of seed as a result of one year's experience, states, "Its feeding value is very great. It is far superior to other rye grass or native grass in this locality." However, its capacity to re-establish itself in these districts has yet to be demonstrated. The accompanying photos. show the stacks of grass straw from the 1917 operations, and the threshing of the stripped rye grass from last season at Messrs. McDougal Bros., Minyip.

STOCK-CARRYING CAPACITY.

Well-corroborated statements of numerous farmers set down the carrying capacity as *double* that of the natural pastures.

At Minyip and Warracknabeal it was repeatedly stated that 1½ sheep to the acre can be "lambled down" on the grass. Further north, on the

lighter soils at Galaquil, where the average rainfall is lower, the figure is set down as 1 sheep to the acre.

To those who know the Wimmera and the Mallee, these certainly seem "tall" figures, but the appearance of the paddocks and the stock on them certainly seems to justify the statement.

In this connexion the impressions of Mr. D. A. McRae, of "Scoribrac," Tourello, near Ballarat, are informative. Mr. McRae stated that last year he spent the months of July and August at Minyip. While there he was "forcibly struck with the vigorous growth and density of Messrs. McDougall's pastures, particularly with the splendid condition of their stock—the milking cows were 'butcher's fat'—the two-year-old heifers were in the same condition, and so well grown—equal to three-year-olds in this district."

The condition of the ewes and lambs was stated to be excellent, the lambs being particularly forward—"Indeed, the lambs at foot of a line of old ewes by Merino rams were, without exception, the fattest lambs



Row of Stacks of Rye-grass Straw obtained at Minyip as a result of cutting and threshing the produce of 140 acres of the grass in 1917.

Yield, 15 bushels to the acre.

I have ever seen for their age—there was nothing I could see on the natural grass in the neighbourhood like them. This rye-grass I consider must possess great fattening qualities, and it is a quick grower."

The following are concrete instances:—The property of Mr. A. W. Milbourne, of "Ailsa," Warracknabcal, consists of 1,200 acres of red and black soil, and the whole area is covered with rye-grass, which has spread from the original stand sown some 25 years ago.

Usually the area absorbed by cultivation, homestead, and timber belts is about 600 acres, leaving 600 acres under grass. For years the subdivision of the cropping has been as follows—wheat, 250 acres; oats, 50 acres; fallow, 250 acres; though it has now been decided to reduce the area sown to wheat by half. The number of mature sheep carried, Mr. Milbourne states, averages about 1,000, and the ewes among them are "lambled down." Last season 1,000 head of mature sheep, comprising 800 ewes and 200 dry sheep, were carried from summer to summer. In addition, the ewes were lambled down, and 400 of the lambs carried forward;

the remaining lambs—Crossbreds out of comeback ewes by Lincoln rams—brought 19s. off shears, and averaged 4 lbs. of wool, worth 12½d. per lb. Some sold in the wool brought 23s.

As an instance of the number of sheep the rye grass that grows naturally on the wheat stubbles will carry, Mr. Milbourne mentioned a paddock of 118 acres off which, in 1917, six bags of wheat to the acre were stripped. In 1918, 320 weaners placed on this paddock on the rye-grass, which came up as usual on the stubbles, were carried there long enough to indicate that they could have been left right through the year without a change if that were desirable. Mr. Milbourne finds "self-sown" rye-grass to yield about the same weight of hay per acre as stubble-drilled oats. A rye-grass property in the vicinity was recently let for grazing at double the normal rental for the district.

Mr. McAlister, of "Marriion Park," Galaquil, has furnished the following instances of the results in the Mallee:—At his property 500 ewes and 300 lambs were placed on a paddock of 280 acres on 1st August, 1918. They were removed as fit in the first week in January, 1919, although the feed was not exhausted. They were sold at Murtoa under the Imperial marketing scheme, and were pronounced "extra prime." The ewes averaged 65-70 lbs. dressed weight, and the lambs 36 lbs.

At Minyip, Messrs. Barnes and Young mentioned the case of their paddock of 196 acres, on which last year 300 ewes had been "lambled down." A truck of the best topped the market at 32s. 6d., while the rest sold as freezers at £1 per head. Owing to a second mating, there was another drop of lambs, which, together with the ewes, the paddock was carrying when seen in the third week in November, when there was still plenty of feed, and the grass was forming seed freely.

Thus the numerous statements as to the high carrying capacity of the grass appear to be justified. All are agreed that stock are very fond of the grass, and will leave other pastures for it. The general consensus of opinion concerning the dry feed, however, is that it is somewhat harsh, though when moistened by dew or rain, and a choice of feed is available, the animals show a decided preference for the rye-grass stubbles. It is claimed, notwithstanding, that stock do well on the dry feed until it is spoiled by the autumn rains. Further, there appears to be an absence of impaction trouble as a result of using the dry feed.

CONTROL.

While there is general agreement among those familiar with the grass with regard to its carrying capacity, the same cannot be said of the opinions expressed as to its suitability for growing on the wheat farm.

There are those who claim that wheat cannot be profitably grown on a paddock that has once been sown down to the grass, and, further, that it tends to spread to other cultivation paddocks. Numerous cases are instanced where wheat-growing had to be abandoned as a result of the grass.

On the other hand, though it is not denied by its advocates that on those farms where the grass has become well established a minimum area is now sown to wheat, yet it is contended that in some cases this reduction was voluntary, and that in others it was the enforced result of slipshod

methods. It is further argued that payable crops of wheat are regularly grown in rotation with the grass wherever proper methods are followed.

The following instances support the latter claim, and at the same time give some idea of the power of the grass to re-establish itself.

Mr. A. W. Milbourne, who states that his yields of wheat have averaged between 7 and 8 bags since the last drought, gives the following experiences:—A paddock of 30 acres of rye-grass, which had been sown twelve years previously, and always very closely grazed, was, after the 1914 drought, assumed to be run out. It was broken up, carefully worked to destroy germinating rye-grass, and sown to wheat. A clean crop of ten bags to the acre resulted. Next year the stubbles were sown to oats, with the result that a heavy hay crop, three parts rye grass and one part oats, was harvested. The rye-grass has grown vigorously ever since.

Again, at Minyip, a much larger paddock of rye-grass than that mentioned above was broken up and worked thoroughly after each rain, to kill the young rye-grass, which came up thickly, and was sown to wheat in 1916. The crop was clean, and nine bags to the acre resulted. The stubbles were burnt early in the following March, and 70 lbs. of oats drilled on the stubble land. The rye-grass came strongly, and 1½ tons of hay, of which nearly half was rye-grass, were cut to the acre. Next year the paddock was thrown out, and the rye-grass again came strongly, yielding about 1 ton of hay to the acre. This year the grass is coming as strongly as ever.

Both Messrs. N. McGilp and H. Johnson, who possess land adjacent to old-established rye-grass paddocks at Minyip, find that they can keep the grass in check. Mr. Johnson has been able to keep the grass out of his property altogether without much extra trouble. On this point Mr. S. E. Schnaars, of Woorack West, *via* Nhill, who has had ten years' experience with the grass, contributes the following:—

"The main objection raised is that it is hard to kill when cropping. Certainly it is a very strong grower, and the land must be well fallowed; but if the plan I mention is carefully followed, a great deal of the difficulty will be overcome. Feed the grass off well with sheep, fire the paddock if the stubble is sufficient, and then lightly cultivate. This will bury the remaining seed and cause it to germinate after rain. Then work the fallow well while the grass is small. After ten years' experience, we are growing better crops of wheat than ever."

This, indeed, sums up the methods of those who successfully cope with the grass. It is most important to encourage germination of the seed early, and to kill the plants before they have a firm hold. It is stated that it is practically impossible to get a payable crop of wheat on a fallow which has not been well worked, though Mr. McGilp quotes a case on his farm at Minyip where a 100-acre paddock (red ground), which has been down to rye-grass for three years, was broken up, harrowed, and the grass got ahead of the sheep. The fallow was disc-cultivated in November, and then harrowed. It was subsequently worked well, and although he did not expect a payable crop, a yield of eight bags per acre was obtained.

Mr. McDougal advocates the sowing of the wheat early. While this would appear to allow the wheat to get an early start, yet there would apparently be less opportunity for killing the germinating grass seed.

SUMMING UP.

It is evident that *Lolium subulatum* (Wimmera rye-grass) possesses characteristics sufficiently strongly developed to warrant the fullest investigation.

According to the information so far secured, the grass—

- (1) will double the carrying-capacity of the present Wimmera and Mallee pastures;
- (2) once sown, does not require re-seeding, even though the land be broken up for cereal crops. An occasional scarifying maintains it at full productivity;
- (3) it can be easily stripped for seed;
- (4) yet retains its seed well attached to the dry straw—hence the dry feed is nutritious;
- (5) it furnishes, if required, self-sown hay of excellent quality, equal in quantity to a stubble-sown crop of oats.

That such a "paragon" among grasses should prove amenable to discipline would seem almost too good to be true, especially as it owes its perennial habit to the wild-oat-like persistency with which it grows annually from seed.

Thus, on the one hand, it may prove a boon to the wheat farmer—but, on the other, it may be found to be one of the worst of pests, hence the need for caution.

It should be noted that most of the information, except that of Mr. McGilp regarding controlability, relates largely to black and other friable soils, and seeing that the suggested treatment is largely based on a species of summer fallowing—a practice which cannot be effectively carried out on stiff clay soils—it is difficult to see how the grass can be coped with as easily on this latter class of soil. Again, it is generally a matter of some difficulty, and, indeed, for wheat-growing it is not at all desirable to reduce this soil to a fine tilth, a condition stated to be essential for the killing of the young germinating grass.

At all events, there is not much doubt that the grass thrives most persistently under certain conditions. Therefore, those wheat-growers who cultivate large areas of clay ground, those who do not work their fallow with judgment, those whose areas are too large to permit of the whole of the cultivation being executed at the proper time, and all those on whose wheat-fields wild oats preponderate, may expect an interference with their present wheat yields should the grass find its way on to their properties. Whether such an inroad will not prove more profitable than present practices it is not proposed to discuss here, because as yet no accurate comparative tests have been made, and until then those farmers who make wheat-growing their main activity, and who fall under the above category, would be well advised to steer clear of the grass—and any other wheat-growers who may test the grass should watch it carefully.

Just what are its exact capabilities, and what influence, if any, it may have on the future of farming on the wheat belt, it is difficult to say. All depends on its controlability. From the purely grazing point of view it would appear to have already demonstrated its high value.

COMMON AILMENTS OF THE PIG.

R. T. Archer, Senior Dairy Inspector.

It is frequently said that the pig is a difficult animal to treat when sick. The best thing, of course, is to guard against disease by treating the animals in such a way as to prevent it. Where sickness is experienced, the information given in the following pages should be of assistance to the pig-farmer.

Constipation.

One of the most prevalent sources of trouble amongst pigs is constipation, and although apparently a simple ailment, often rapidly leads to serious results. If, however, plenty of green feed be supplied to the animals, there is little likelihood of their becoming constipated. As soon as it is noticed that the faeces are dry and hard, action should be taken to alter this condition. Pigs' dung should never be too hard nor too soft. If fed on dry food, care should be taken that plenty of water be available. Bran is of great assistance in keeping the bowels in order, and the amount should be increased if there is any sign of constipation. When the pigs are fattening, their feed should be more sloppy than usual.

A prominent authority, discussing constipation in pigs, says:—"It is important to remember that in this disease the alimentary canal is overburdened with matter, and for this reason the supply of food should, for a time, be much restricted or altogether withheld."

The withdrawal of solid food for twenty-four hours, and the substitution of a simple wash, with a small allowance of roots, will lighten the burden of the bowels, and assist in restoring their normal activity.

A bold dose of sulphur and Epsom salts may then be administered in a little tempting food, or, should this be refused, castor oil may be offered in the same way; where both are declined, one of them must be forcibly but carefully administered, and again repeated if the bowels do not respond in twenty-four hours.

Injections of warm soap and water will prove serviceable in relieving the posterior bowel, and should be administered once or twice a day until a free action is induced.

If there is any tendency to a return of the constipation after once the bowels have been relieved, a little common salt and sulphur with Epsom salts should be given in the food for three or four days. Where habitual constipation exists, the most reliable corrective will be found in a liberal daily ration of roots or a little linseed oil mixed with the ordinary food morning and evening. In heavy breeding sows with costive habit, one or the other should always be provided where a run of grass is not available.

Diarrhoea.

Diarrhoea usually results from direct action of some irritant in the water or food. It may also occur as a symptom of a variety of diseases.

The liability to diarrhoea is much greater in young than older pigs. The particular causes of the complaint are sudden changes in the food, as when rank rapidly-grown grass or certain acrid plants are taken after

a continued use of more substantial fare. Intestinal worms, the excessive consumption of putrid animal or vegetable matter, the indiscriminate administration of salt, either as brine or otherwise, are frequent causes. It also occurs in tuberculosis, rickets, and other constitutional affections. In the first-named disease, it invariably assumes a chronic form. In sucking pigs, it is usually due to vitiated condition of the milk of the dam, or insanitary state of the sty, and not infrequently to decomposing matter fouling the teats of the sow.

In case of suckers, the sty, &c., should be clean, bedding dry and clean, and they should be protected from cold and wet. The food of the dam should be sound and wholesome. The teeth of the little ones should be attended to, and any that are too sharp and likely to irritate the sow should be cut off. Young nervous sows sometimes become so irritated that the milk becomes changed, and acts prejudicially to the young.

In mild cases there is only temporary derangement, which quickly passes without giving rise to pain or other signs of illness. In some cases, however, the discharge continues for days, and there is more or less wasting and loss of appetite, with coldness of the skin and extremities, and general dullness and depression. When diarrhœa is accompanied by pain, the pig is restless, its back is arched, its belly tucked up, and the excrement has a strong offensive odour. In young suckers the discharges are sour-smelling and are mixed with mucus, containing solid masses of curd, and may be streaked with blood.

There is no hard and fast rule for dealing with this complaint. It is a case of removing the cause, if possible, to effect a cure. The first thing is to give a dose of castor oil, 1 oz. (two tablespoonfuls) to 6 oz., according to size of pig, and then to see that the animal receives good wholesome food. If the pig will not take the medicine in the food, it must be given as a drench. When there are indications of pain, a few drops of laudanum may be given—for suckers, two or three drops on the tongue. After the diarrhœa has been checked, one-drop doses of nux vomica daily may be given for several days as a tonic.

A very good tonic to keep in stock consists of:—

Powdered gentian	..	..	..	1 oz.
Powdered nux vomica	..	..	..	1 oz.
Sulphate of iron	..	..	..	1 oz.
Bicarbonate of soda	..	..	..	6 oz.
Sulphate of soda	..	..	..	6 oz.

Mix and give one teaspoonful to each animal once or twice daily.

Rickets.

This is a disease in which there is a marked disturbance of nutrition, and the animal is unable to properly develop bone tissue. The bones are soft, and there are swellings and deformities.

The disease is almost entirely due to food deficient in bone-forming material, principally phosphate of lime. If the dam is properly fed, her milk will be rich in all necessary salts, but trouble may develop after the pigs are weaned. This will be especially so when they are fed largely on maize, as this grain contains only a small percentage of mineral; therefore other grain, rich in mineral matter, should be given to young pigs. There is nothing better than pollard; oatmeal is also very good.

For very young pigs, the husks are rather too irritating, but soon they will be able to take crushed oats. Bonemeal or phosphates should be given to all growing pigs, the former for preference. This should be given regularly in the food (one tablespoonful per 100 lbs. weight of pig), and will be the best safeguard against rickets.

Apoplexy.

This is due to congestion or a rush of blood to the brain. It is frequently seen in young pigs in close confinement, especially when changed from poor to rich and abundant feed. Worm infestation may be, if not the actual cause of the trouble, at least a predisposing cause. Forcing with too much animal food, such as blood and refuse from the slaughter house, after a scant vegetable diet, is also a cause. It may also result from sudden exertion on the part of fat animals or heavy sows, especially in hot weather. Even without exertion in hot weather they are very subject to it. Violent straining during parturition, especially in old sows, is an occasional, and almost uniformly fatal, cause.

The attack is usually very sudden. The animal, apparently in good health, is seized with a fit, and falls to the ground, or may have a brief convulsion, and stagger helplessly over. There is no effort to rise; the limbs are limp, and helplessly paralyzed. The vessels of the head are engorged with blood, the lips, snout, and tongue become red in colour, and afterwards livid and blue. The eyes are widely opened, and display no sensibility to the touch. The breathing is slow and deep. Urine passes involuntarily, also excrement from the bowels.

Not much can be done for this trouble. In hot weather the pigs should be provided with water to wallow in, and when attacked should have cold water poured over the head, but not the rest of the body. If the animal is properly bled, the flesh is quite good and wholesome, provided no other disease inimical to human health is present.

Rheumatism.

Rheumatism, frequently described as "cramp," is a constitutional disorder, sometimes assuming the form of a fever. It is characterized by stiffness, or more commonly lameness, which may be attended by swelling of the parts. It may be acute, and quickly fatal, but mostly assumes a chronic character, and continues for long periods, or disappears and returns again at longer or shorter intervals. Besides the limbs and trunk, it sometimes affects the heart, and proves fatal.

The direct causes are chiefly chills from exposure to cold and wet after fatigue and fasting, or over-heating. Sows, when suckling, often contract it if confined in small damp stuffy styes. Sprains and injuries may sometimes provoke an attack of rheumatism from inaction and lying in damp places. Among the more prominent symptoms are indications of stiffness, pain, and lameness, but the changeable character of these distinguishes it from the results of accidents. There may be considerable swelling of the joints.

To treat this disease, the animal must be placed in a dry place, free from draughts, with plenty of dry bedding. The bowels should be freely opened by a full dose of Epsom salts. Small doses may be given daily, and the animal fattened off as soon as possible.

Pneumonia.

This is a disease in which the tissue of the lungs is the seat of an inflammation.

The disease may be due to a variety of causes, but is generally due to a chill after having been overheated. Fat pigs are more liable to it than lean. Overcrowding, during which they become heated, afterwards subjected to cold rainy weather, is a common cause of pneumonia. Lying on rotting fermenting bedding is another very frequent cause, also lying under the bottoms of straw stacks, particularly in winter, pneumonia probably following on a chill when the pigs leave their hot bed, but it is also partly due to their inhaling ammonia which is being given off, as the inhalation of irritant gases will produce pneumonia. Draughty styes, due to crevices in the walls, should be carefully avoided. The styes should be well ventilated, but free from draughts. Over-driving fat pigs is a frequent cause, and unskilful drenching, when the drench gets into the windpipe, is often responsible for it. Pneumonia, it may be mentioned, is a phase of swine fever.

The complaint sets in with a severe chill, the temperature rises rapidly, and the animal becomes very sick. In some cases death follows in a few hours, perhaps before the owner has noticed that there is anything wrong. In other cases, that run a little longer course, there is loss of appetite, marked dullness following the initial chill, and rise in temperature. The animal stays in its bed, lying on its belly or affected side. Breathing is rapid, short, and apparently painful. This condition is often popularly known as heaves. A cough becomes an early symptom, and is of a dry, harsh character at first, but becomes moist later, with discharge often streaked with blood, from the nose. In some cases there is considerable bleeding at the nose, and the lining membrane of the nose and mouth is congested and dry in appearance.

Prevention is better than cure, and if proper conditions of living are provided for the animals there will not be much trouble from this disease. Yet, no matter how careful one may be, the chances are that pneumonia will appear occasionally. The sick pig should be placed in a clean warm well ventilated sty, with plenty of sunlight if possible, and covered with a rug. Its food should be of a sloppy nature, bran mashes or other soft easily-digested foods being given warm, and no dry food for at least two weeks after recovery. A dose of calomel and castor oil should be given, and the oil repeated every second day for three or four doses. Plenty of water with the chill removed should be given.

The following mixture may be given:—Carbonate of ammonia, 3 grains; tincture of aconite, 4 drops; solution of acetate of ammonia, 30 drops. This is a dose for a pig 100 lbs. live weight—an ordinary porker—and may be given twice daily in milk or other liquid food.

Intestinal Worms.

Frequently pigs suffer very much from intestinal or stomach worms—a trouble often the cause of great loss to the pig-keeper. These parasites obtain their nourishment from the food the pig eats, and when present in large numbers starve the animal. To compensate for this double demand, a much larger amount of food is consumed. In spite of this increased supply of food, the animal loses flesh, becomes

weak and impoverished. The back is arched, and the belly is either tucked up at the flanks or is unduly enlarged, the latter generally when the pig has a ravenous appetite. Pigs largely infested are fretful and unsettled; they wander about grunting and squealing, and seldom rest as do healthy stock. Vomiting, during which some worms are ejected, is sometimes present, and fits of a convulsive or epileptic nature are, in some cases, frequent. Irregularity of the bowels, with occasional diarrhoea, appear in the later stages of the disorder, and the appetite falls away, thus adding to the emaciation and weakness.

The best way to treat this trouble is to give in the food areca nut, $\frac{1}{2}$ to 1 grain per lb. live weight of the pig, or 2 to 10 grains of santonin per pig, according to size. A good way to administer the medicine when there are a considerable number of pigs affected is to get it put up in packets containing enough for ten pigs. This quantity may be mixed thoroughly with the food, which should then be fed immediately to the animals. It is then fairly evenly distributed amongst the pigs, and each gets about equal quantities. Calomel at the rate of 5 grains per 100 lbs. live weight may also be given should the former drugs not be obtainable. For some kinds of worms turpentine will be found more satisfactory, a teaspoonful to a tablespoonful, according to size of pig, being given in milk slop. This should be given on an empty stomach, and with it castor oil, two to twelve tablespoonfuls, according to size. Such a dose will help to clear the worms out of the stomach.

Inflammation of Udder.

This is not an uncommon trouble, especially with heavy sows which are good milkers. The udders are liable to injury by bruising, &c., and become infected by bacteria resulting from their dirty conditions.

Sows that lose part or all of their litter, and which have a large supply of milk, are especially likely to develop a diffuse inflammation of the udder.

Inflammation of the udder may be of a simple nature, with hot, painful swellings, but without the formation of any pus or abscesses. On the other hand, it may be a deep-seated abscess.

Symptoms.—The inflamed udder becomes swollen, hot, painful, and very tender to the touch. The soreness may become so aggravated that the sow will not allow the little pigs to suck. There is also usually considerable rise in temperature, loss of appetite, and constipation. The milk often becomes affected, and may cause scouring among the little ones.

Treatment.—Preventive treatment consist in keeping sows in clean conditions. Sore teats should be bathed with alcohol, or a strong solution of alum, or the white lotion, consisting of 3 drams each of sulphate of zinc and lead acetate, and 16 oz. water.

When there are signs of inflammation, the sow should be given a full dose of Epsom salts, and the udder bathed frequently with hot water, followed by gentle massage with camphorated oil. If much fever be present, two or three drops of aconite in water may be given twice or three times a day. If the udder becomes very painful, a local application of belladonna may be used in the form of an ointment, consisting of extract of belladonna, $\frac{1}{2}$ dram, to 2 oz. vaseline. An equal amount of gum camphor may be added, and will increase the value of the ointment.

It must be remembered that belladonna checks the secretion of milk, and if applied for several days may entirely dry it up.

Swine Fever.

Swine fever is the most serious disease in pigs that is known, and the annual loss in countries in which it is present is enormous. It is estimated that in America the loss amounts to £16,000,000 per annum. In Victoria it caused havoc some years ago, but the measures taken were efficient, and it is now some time since an outbreak was reported. In the interest of the industry, it behoves every pig-farmer to be on guard, and to report to the Chief Veterinary Officer any suspicious cases.

Professor Sir John McFadyan's investigations go to show that the disease is not caused by the so-called swine fever bacillus, as was formerly thought, though this organism is almost always present in the blood of pigs seriously ill with swine fever. It is caused by ultra-microscopic bacteria that will pass through the filter. This organism has not been cultivated outside the body of the pig. By feeding or inoculating with a pure culture of the so-called swine fever bacillus, pigs may be made ill or fatally affected, and *post-mortem* appearance of intestines appear identical with swine fever, but pigs recovering from the disease due to inoculation with this culture are not immune from swine fever, nor do they pass on the disease to other pigs kept in contact.

The blood from a swine fever pig can cause swine fever in a healthy pig, although so-called swine fever bacillus is absent, as is always the case in early stages of swine fever. When the bacillus was present in swine fever blood, the latter remained infective after these bacilli had been removed by filtration or killed by disinfectants.

Through the blood the virus is diffused throughout the whole of the organs and tissues of the body, in the alimentary canal and urine.

The disease is mainly spread by contact, and may be carried by faeces, urine, discharge from eyes, lungs, skin, &c.

Symptoms.—The temperature normally is 102 degrees to 103 degrees Fahrenheit, and in swine fever generally rises 3 or 4 degrees. This rise generally takes seven to ten days after infection, but may be two days after. This rise in temperature is not only the first discoverable evidence of infection, but also the most constant, since it may be detected in mild cases, in which outward symptoms of actual illness are never exhibited. The actual symptoms are loss of appetite, dullness, unwillingness to move, and inclination to burrow into litter if plentiful. Usually the sickness is most pronounced in the second week after natural infection. Diarrhoea is often, but not always, present. In fatal cases, rapidly-increased weakness and hindquarters swaying when walking are noticeable symptoms. The animals are usually thirsty, but always refuse food. Sometimes a reddish or livid colouration of the skin is noticeable. The affected pigs may develop a cough, or rapid breathing, due to pneumonia—a fairly frequent complication. Sometimes they display no outward symptoms. Death, as a rule, takes place not less than a week after the first symptoms, but may be only two or three days, and, on the other hand, frequently it may not be for several weeks.

It is possible that some animals recover incompletely, and become carriers.

Lesions usually diffuse inflammation in stomach and intestines, congestion of lymphatic glands, and small hæmorrhages in kidneys, serous membranes, &c. Typical lesions in cases two or three days old are ulcers about the size of a threepenny or sixpenny piece, some larger, with deep centres, situated at the junction of the small intestine with the larger.

Frequently mucus membranes have adhered to them a whitish or yellowish material similar to that found in diphtheria in the human patient. Ulcers in the early stages stand out, but later slough off and show a depressed ulcer.

The disease may assume the form of pneumonia and pleurisy.

The so-called swine fever bacillus are the cause of the typical ulcers, and can be produced by pure cultures, but the ultra visible virus, which is the true cause of the disease, does not produce these lesions, which are a guide towards diagnosis.

The so-called swine fever bacillus is a common, if not constant, inhabitant of pigs' intestines. Pneumonia used to be designated swine plague or contagious pneumonia, and was erroneously considered a separate disease.

There is no known cure for swine fever. As a preventive, inoculation with serum has been carried out in some countries with more or less success. By the exercise of care and keeping newly-purchased pigs in separate enclosures, the risk of introducing the disease can be reduced to a minimum. Cleanliness should be the watchword for those who wish to keep their pigs free from this dread disease.

Tuberculosis.

One of the most serious complaints that affect pigs in this country is tuberculosis. There is no known cure for this disease, which is chiefly derived from the milk of tuberculous cows. In all dairying countries this is a troublesome disease, and so far has baffled the efforts of scientists to produce either immunity or cure, save in the earliest stages in the human being. The best-known method of combating it is to eradicate as far as possible the sources of infection. This is gradually being effected by the operation of the Dairy Supervision Act, under which all cows in milk are handled by a dairy supervisor, and those showing unmistakable signs of the disease are destroyed. Fortunately the bacteriologist has discovered a serum—tuberculin—which, in the hands of a qualified man, is an infallible guide as to the presence of the disease in a cow. It is only a matter of time when the public will insist that all dairy cows shall be tested, as is done in some of the States of America. Unfortunately, the Dairy Supervision Act does not apply to the whole of this State, and the result is very strikingly shown in the table given on the next page. This shows that, where the Act is in operation, resulting in the destruction of the detected tuberculous cows, the number of tuberculous pigs is very much lower than in those districts where there is not the same effective supervision. Under the Meat Act, all pigs slaughtered for human consumption must be examined by a qualified inspector before being allowed to pass to the retailers. This insures that all the pork or bacon retailed is free from disease.

DISTRICTS UNDER THE MILK AND DAIRY SUPERVISION ACT.

Place.	July to December, 1910.			January to June, 1911.			July to December, 1911.			January to June, 1912.			July to December, 1912.		
	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.
Ballarat ..	6,675	191	2·86	6,356	139	2·18	10,213	487	4·77	13,274	313	2·35	10,611	385	3·63
Geelong ..	3,868	224	5·79	4,102	207	5·04	6,088	441	7·22	4,862	248	5·10	4,651	223	4·79
Kilmore ..	701	16	2·28	328	5	1·52	607	17	2·80	620	28	4·51	552	4	0·72
South Gippsland ..	1,680	64	3·81	1,806	97	5·11	214	11	5·07	1,606	92	5·72	3,718	289	7·77
Totals ..	12,924	495	3·83	12,682	443	3·53	17,122	956	5·58	20,362	681	3·34	19,532	901	4·61

DISTRICTS NOT UNDER THE MILK AND DAIRY SUPERVISION ACT.

Place.	July to December, 1910.			January to June, 1911.			July to December, 1911.			January to June, 1912.			July to December, 1912.		
	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.	Number.	Affected.	Per Cent.
Camperdown ..	2,210	335	15·22	2,254	275	12·04	1,979	494	24·96	3,166	657	20·75	2,214	504	22·76
Colac ..	6,529	894	13·69	5,848	624	10·67	6,539	1,035	15·82	6,267	966	15·41	8,181	1,311	16·02
Traralgon ..	3,298	1,178	35·72	6,099	849	13·92	3,746	970	26·16	4,212	990	23·50	4,288	1,051	24·57
Warrambrook ..	9,826	1,479	15·05	7,632	859	11·25	8,665	1,576	18·18	9,829	1,683	17·12	7,654	1,350	17·54
Totals ..	23,666	3,886	16·6	20,353	2,607	12·89	20,920	4,075	19·51	23,474	4,296	19·195	22,337	4,186	18·74

EXTRACT FROM SUMMARY FOR EACH PERIOD.

Under Milk and Dairy Supervision Act.						Not Under Act.					
Period.		Number.		Affected, Per Cent.		Period.		Number.		Affected, Per Cent.	
July to December, 1912		..	19,581	926	4·65	July to December, 1912		..	25,019	4,283	17·12
EXTRACT FROM SUMMARY FOR PROGRESSIVE PERIODS.											
July, 1910, to December, 1912		..	84,801	3,536	4·17	July, 1910, to December, 1912		..	134,677	19,963	14·82

APPLE CULTURE IN VICTORIA.

(Continued from page 157.)

By J. Farrell, Orchard Supervisor.

COPPER-SODA SPRAY.

It is now generally recognised that in making Bordeaux mixture the use of good fresh lime is essential. In remote districts, and during certain periods when good lime is unobtainable, growers resort to the copper-soda spray, in which washing soda is substituted for the lime. In fact, on account of the ease with which this spray can be prepared, and because of the good results which attend its application, some orchardists use it in preference to the Bordeaux. The copper-soda formula generally adopted is the 6-9-50, that is, 6 lbs. of bluestone, 9 lbs. of washing soda, and 50 gallons of water. The method of dissolving the ingredients and the process of mixing them are similar to those involved in the manufacture of the Bordeaux. In applying this, as well as other sprays for the same purpose, the objective of the operator should be to drench the trees thoroughly. Owing to the more watery nature of the copper-soda, however, the slight deposit remaining on the trees after the moisture has dried off is hardly perceptible. The best results are obtained from the use of fungicides when the spraying season is comparatively dry, and this remark applies to copper-soda more than to any other such spray. When copper-soda is applied on a dry day followed by rain, the deposit being lighter and probably more easily soluble in rain water than those of other mixtures on the second occasion, the fungus destroying agent is washed away, thus rendering a second application more necessary.

A few years ago, several growers used "neat bluestone," that is, bluestone at the rate of 1 lb. to 25 or 30 gallons of water without any other ingredient. Good results were claimed for this spray the first year, but its use during the second spraying season proved unsatisfactory, as, while much foliage was injured, the spray did not control the spot.

LIME-SULPHUR.

Growers who now employ the lime-sulphur spray almost invariably use the commercial product. Opinions of growers are divided as to which is the more effective spray, this or the Bordeaux mixture. Many experienced orchardists, having experimented with both, have declared in favour of the Bordeaux, but lime-sulphur still has numerous advocates. The general principles governing the method of application and times for spraying with lime-sulphur are similar to those relating to the use of Bordeaux mixture. When one spray only is given for the "early infection," its strength should range from 1 in 15 to 1 in 20, applied when the blossoms show pink. When the earlier spray, as explained in connexion with the use of Bordeaux, is also given, its strength is usually from 1 in 12 to 1 in 15. In dealing with varieties which experience has proved to be of a sensitive character, or when spraying to cope with "midseason attack" or for "late spotting," the strength of the mixture may be regulated to suit the existing requirements.

The desirability of paying special attention to this detail in spraying is illustrated by the condition of the four young apples appearing in Plate 194. These were showing spot when they had advanced about four weeks from the setting stage, and were sprayed with commercial lime-sulphur 1 in 20. As will be seen by the rusty, cracked, and contorted condition of the specimens, the strong solution more injuriously affected the fruit than would the disease. The leaves of the tree from which these apples were taken were also somewhat scorched by the spray. Probably a solution of, say, 1 in 50 at this stage would have controlled the spot without injuring the fruit or foliage. Orchardists, inexperienced in the use of lime-sulphur mostly, instead of attributing the scorching to an over-strong mixture, assume

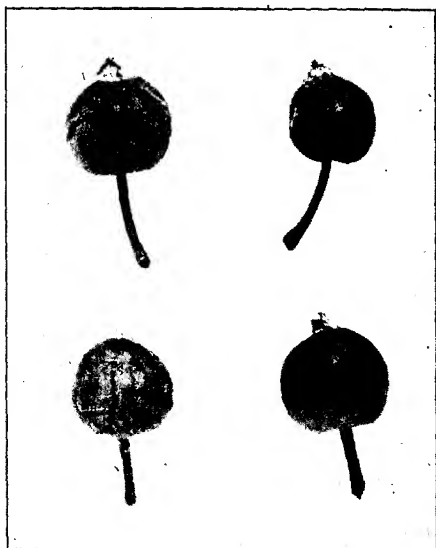


Plate 194.—Young Apples Seriously Injured by Strong Lime-Sulphur.

that the injury is due to the product being of inferior quality. Lime-sulphur does deteriorate, however—the stock mixture, if not properly kept in airtight containers, and the dilute solution, if allowed to stand too long after being prepared for use. Many cases of scorching have occurred in the past owing to lime-sulphur having been allowed to deteriorate in one of the ways mentioned.

Extensive experiments were carried out in America some years ago to test the relative merits of Bordeaux mixture and lime-sulphur. The results showed that Bordeaux was the better fungicide, but, being more liable to cause russetting after the fruit had set, the lime-sulphur was recommended for use after this stage.

If the ingredients in the Bordeaux be of good quality, properly mixed, and in relation to strength as judiciously applied as is necessary in the case of lime-sulphur, the writer's experience is that very little damage follows its application, even after the fruit has set.

The following extract is taken from an article* written by W. Laidlaw, B.Sc., Biologist, and C. C. Brittlebank, Vegetable Pathologist, concerning their spraying experiments for "black spot" in the Gippsland district:—

"Experiments in the treatment of black spot were made on six different varieties, all of which are commonly grown throughout the State.

The disease was very prevalent in the orchard where the experiments were conducted, in wet years the bulk of the apple crop being so badly affected as to be unsaleable.

The past season's rainfall was above the average at Drouin. The spraying season—September and October—was exceptionally wet. During these months there were 43 wet days and 11½ inches of rain fell. Notwithstanding this excessive rainfall, the experiments were very successful, as will be seen by the results.

Last season we confined our experiments to the lime-sulphur spray principally, using the commercial product. Three different brands were used, and each gave equally good results. The cost of material works out at 3d. per tree.

The dates on which the different varieties were sprayed are given below, not as a guide, but as showing the time when the buds were more green than pink, which was the condition of the trees when the first spray was applied. The second spray was given when the centre flowers of the blossom cluster were fully open.

We are of opinion that the time of spraying is more important than the fungicide used, provided the mixtures are properly made and tested. While making this statement, we must point out that the result obtained from lime-sulphur last season was very much better than that obtained from Bordeaux, 6-4-40. The foliage looked healthier, and remained longer on the trees; the skin of the fruit had a better colour, and was clearer and sappier looking.

We would like to impress on growers the necessity of having all the cultivation done before spraying is commenced. The reason for this is that the resting spores have developed in the fallen diseased leaves of the previous season, reaching maturity at the time the apple trees are coming into blossom.

Under favorable weather conditions, they are thrown out in countless numbers, and are carried by air currents into the young leaves and fruits, where they germinate and infect the crop. Cultivation should not be resumed till all danger of infection is past. This period will vary in different districts and under different weather conditions.

* Published in *Journal of Agriculture* (Victoria), August, 1918.

Hereunder are details of the yields obtained from the apple trees upon which experiments were made:—

Jonathan.

Eighteen trees sprayed with lime-sulphur—

1st spraying, 1 in 12, on 19th September, 1917.

2nd spraying, 1 in 30, on 1st October, 1917.

First picking on 27th February, 1918, gave—

22 cases clean and good;

4 apples with slight spot, but marketable;

16 apples with spot, but marketable;

9 cases of windfalls, all good.

Second picking on 21st March, 1918—

46 cases good and clean;

20 cases with black spot;

3 apples with codlin moth;

2 cases windfalls, all clean.

One Jonathan tree sprayed once, 1 in 12, on 19th September, 1917, picked 21st March, 1918—

4 cases clean and good;

39 apples with black spot;

5 apples with black spot, but marketable;

2 apples with codlin moth;

1 case windfalls, all good.

Jonathan check tree, no spray, picked 21st March, 1918—

1 case of marketable, slightly marked with black spot;

4 cases badly spotted, unmarketable.

The average number of Jonathan apples to the case was 186."

Plate 195 illustrates the condition of the Jonathan blooms when the first and second spray were applied.

The other varieties experimented with were London Pippin, Rome Beauty, Statesman, Rokewood, and Yates, in the case of which somewhat similar results were obtained. For particulars concerning these see the journal referred to in the footnote.

Owing to the process of pollination and fertilization, which have been previously explained, it will be understood that the trees should not, if possible, be sprayed with caustic mixtures while in the full-bloom stage, and particularly in cases where cross-pollination is desired. This precaution is necessary in order to maintain the healthy condition of the sexual organs of the flowers, and thus facilitate the work of bees and other helpful insects.

COMBINATION SPRAYS.

While dealing with the matter of spraying for insect pests and fungus diseases, it might be well to mention that, although the majority of our apple-growers spray separately for codlin moth and black spot, some employ the combination sprays. These constitute Bordeaux mixture combined with arsenate of lead, and lime-sulphur-arsenate of lead. These dual-purpose mixtures are mostly applied at the second and subsequent sprayings for codlin moth to save the time and labour involved in using separate fungicides to cope with black spot at those periods.

In making the combination mixtures no standards are observed, but care should be exercised that the fungicide, particularly the lime-sulphur, be not too strong, as the arsenate of lead when incorporated in the mixture seems to intensify its caustic properties. The application of such a deleterious spray often causes injury both to the foliage and to the fruit. Because of the frequency of scorching experienced by growers who have experimented with the combination mixtures during the last two years, some have discarded these, and have reverted to the practice of using the separate sprays. Owing to the varying conditions under which these are made up, the actual chemical change effected by combining the fungicide with the insecticide is not generally understood. If this be not determined by a chemical test, then a weak mixture should be at first used, and by practical experiment increased in strength until a suitable spray is obtained.



Jonathan bloom, showing condition when first spray was given.



Plate 195.

Jonathan bloom, showing condition when second spray was given.

ROOT FUNGUS (*ARMILLARIA MELLEAE*).

This fungus is indigenous to Australia, and lives on the roots of native forest trees and shrubs. It may be found on any class of soil infecting introduced trees and plants, and no kind of fruit tree is immune from its attack. In one stage of its development the parasite may appear as thin white filaments on the bark near the points of the small roots. Later it may be present as a whitish felty substance living in the cambium beneath decaying bark. It is best known and most easily recognised, however, when numerous thin black strands, fastened to the bark of a large root, give it the appearance of being enclosed in wire netting. For this reason it is sometimes termed "wire fungus."

and, on account of the manner in which it attaches itself to the bark, it is also known as "ivy fungus."

When the results of infection become apparent, the tree seems as if waterlogged, and, later, the points of the leaders begin to die back, like those of a tree suffering from root borer, but no sucker growths are produced, as in the case of borer infection.

The parasite lives on the sap drawn from the roots and, after a time, the fungus fructifies by producing toadstools on the ends of the strands at the soil level on the stem of the tree. When considerably weakened by serious infection many trees collapse at this stage. In the experience of the writer, this fungus is more prevalent in, and causes more destruction to trees growing on loose, red or chocolate soils and deep sandy loams than elsewhere.



Plate 196.

Virgin Land being Prepared for Planting.

The fungus on young trees may be destroyed by removing the soil and spraying the roots with Bordeaux mixture 6-4-40, and then replacing the soil. It is obvious, however, that in dealing with large trees this method would be impracticable. Now it will be conceded that the best means of coping with this parasite is by adopting the preventive measures previously mentioned. These, it may be again stated, consist of carefully removing the roots when grubbing the land to be planted, and afterwards sweetening it by cultivation until such time as the fungus in the soil has been destroyed. Trees thrive better on virgin soil than on land which has been cropped for a lengthy period, but this parasite rarely attacks trees planted under the latter conditions.

Plate 196 shows the preliminary operations of grubbing and cultivating being carried out. Some planters, after grubbing the larger of the native timber, plough and harrow narrow strips in which they

plant the rows of trees, and, as these develop, the strips are annually extended in width until the whole area is brought under cultivation.

FUNGUS DISEASES NOT AMENABLE TO SPRAYING TREATMENT.

These consist of fungi which attack matured apples when stored or during transit to Inter-State or to the Home markets. Prior to the advent of cool storage, very considerable losses were sustained, numerous cases having been condemned at the ports of shipment, while many others arrived in London in a rotten condition. Even after the general adoption of refrigeration, and until fairly low and uniform temperatures were maintained, much fruit was destroyed by the "rots" affecting ripe apples.

The principal fungi which cause the rotting of apples under the conditions explained are—

- (a) Bitter rot (*Gloeosporium fructigenum*, Berk.), the spores of which on germination penetrate the skin of the apple and through further development cause circular brown spots to become visible in the rind. As the fungus grows the spots increase in diameter and appear as depressions. The pulp in the diseased parts becomes brown and soft, the disease spreads until the whole apple becomes a mass of rotten pulp, and the pink-coloured spores appear on the surface.
- (b) Mouldy rot (*Penicillium glaucum*, Link.) infects the fruit similarly to bitter rot and destroys it in like manner. The spores of this disease are of a greenish colour. Bitter rot almost invariably infects ripe fruit, but this fungus often attacks apples on the trees before they commence to ripen.
- (c) Mouldy core of the apple is produced by the same fungus which causes mouldy rot. In this case, the infection commences at the core and spreads outwards until the whole apple becomes rotten. This condition of the disease is mostly found in varieties like Rymer, Grand Duke, &c., with open calyxes, which offer the spores a free passage to the core. It is difficult to detect apples affected in this way, but the danger in storing them is that the spores may escape from the core condition of the disease and cause the superficial rotting of other apples as well.

Possibly many of the spores are destroyed by the black spot sprays, but, as these diseases are confined to the fruit and do not appear in the virulent form until after fruit picking, they cannot be regarded as amenable to spraying treatment. On account of their insidious nature, however, preventive measures should be employed to combat them. No diseased fruit should be allowed to remain in or near the packing shed or storeroom. Fruit for storing should be carefully handled at the time of picking and packing, as the spores more easily infect fruits with bruises or abrasions of the skin than those with sound rind. The fruit in store should be regularly inspected, and any specimens found to be diseased should be removed and destroyed, for one diseased apple may infect an entire case. However, paper wrappers used in the export trade so completely isolate each apple from its neighbour that, when carefully stored and with well-regulated temperatures the spread of infection is rendered practically impossible. Careful packing should

also be practised when forwarding apples without wrappers to Inter-State markets, as the moisture due to the deterioration present in and radiating from a diseased fruit, offers the condition favorable to the rot commencing in others, especially if they be in a sweating condition.

CRINKLE.

This disease, the presence of which is indicated by comparatively extensive dark depressions in the surface of the apple, is responsible, during seasons when unusually prevalent, for the destruction of a high percentage of the fruit, particularly of varieties most subject to its attack. The diseased portion, during normal seasons, is mostly confined to one side, and usually inclines towards the calyx end of the apple, the stem end being only rarely affected. In seasons of virulent infection, however, numerous specimens with but little sound surface or healthy pulp are common in the orchards. London Pippin and Rome Beauty are the two varieties most subject to crinkle, and much of this fruit was destroyed by this disease during the seasons 1907 to



Plate 197.—London Pippin Apple, showing Crinkle.

1911. But the climax was reached in 1912, when the visitation was followed by such disastrous results that only a very small percentage of the crop of the varieties mentioned was worth harvesting. This had the effect of considerably restricting the planting of these varieties, and particularly the London Pippin; but, although crinkle is present every fruit season, the damage caused by it in recent years has not been very serious.

Usually the crinkle or confluent bitter pit, as it is now sometimes termed, is so highly developed in the affected apples by the time they are fully grown and before ripening commences, that its presence is

readily recognised. This is the stage illustrated by the fully grown London Pippin apple in Plate 197, and the slice cut from the diseased part of the specimen reveals the condition of the interior. When this stage is reached, and as ripening proceeds, withering of the pulp cells beneath the brown tough tissue continues. Thus the diseased tissue extends until, in many instances, the whole of the flesh between the core and the rind in the affected areas becomes involved. Usually the crinkle appears as an irregular patch or patches around the calyx end of the apple, practically destroying the whole of the fleshy part of this region. Occasionally, however, the diseased sections run vertically in strips interspersed with healthy ones, giving the fruit a corrugated appearance. The diseased sections become more and more depressed as the crinkle develops. Objectionable sectoral inequalities in the surface are thus created, and those become even more apparent if the affected apple be viewed in transverse sections.

In seasons when abnormal development of crinkle occurs there is hardly a variety immune from its attack, and those most liable to be infected may develop the disease on any class of soil or in any locality, irrespective of the weather conditions prevailing. The cause of this disease is unknown, consequently no direct remedial treatment can be applied. As it is recognised that contributory causes are involved, however, certain indirect preventive measures are now being adopted. The large fruits of trees making vigorous growth on rich land and bearing light crops are more liable to crinkle than apples on trees having developed the fruiting habit under normal conditions. Scientific pruning and judicious cultural treatment are the measures referred to. It is not suggested that the adoption of these controls crinkle; they, nevertheless, act as helpful palliatives.

(To be continued.)

ENSILAGE A CHEAP FOOD.

Among the cheap modern foods that go to make up a ration, none, when properly fed, surpasses ensilage. It is a succulent food that aids in the digestion of other foods, materially increasing their value for the production of milk and butter and beef. The partial fermentation which takes place in silage after it is cut and stored starts the process of digestion, and renders it the most valuable of succulent foods.

Many feeders depend too much upon ensilage as a balanced food, and feed from 40 to 50 lbs. a day. An ample ration is from 30 to 35 lbs. daily for the milk-producing cow. If 8 to 12 lbs. of hay or wheat, oats, or buckwheat straw are added to the grain food, a complete ration will be formed.

It is the greatest mistake to keep the manger filled with hay or straw. The cow should only be given what she will eat, and if any should happen to be left over it should be removed. Most skilled men agree that two feeds a day are better than feeding oftener. Buckwheat straw properly cured contains more food value than good oat straw. It has about 25 per cent. more protein than oat straw.

—*South African Dairymun*, March, 1919.

DAIRYING AT BACCHUS MARSH.

By H. C. Churches, Dairy Supervisor.

Thirty-two miles from Melbourne, on the direct Ballarat railway line, the train, after passing through a cutting, suddenly brings the passengers in view of that wonderfully rich alluvial valley land known as Bacchus Marsh, lying between the Werribee River and its tributary, the Lerderderg. The place derives the first portion of its name from the late Captain W. H. Bacchus, one of the pioneers of the district, who settled there in 1838. If, however, any "marsh" land existed in the locality in the very early days, there is none now; in fact, it would be difficult to find any except well drained, well cultivated, and highly productive land. Some very fine specimens of red-gum trees still remain in various parts of the district, and their well developed trunks and wide spreading branches indicate that the land on which they grow was always favoured with good drainage.

During the last half-century the dairy farming industry has increased greatly here, and its dairy farm produce and its lucerne hay and chaff have given Bacchus Marsh a reputation, which has made the locality very widely known. The district has rather a light rainfall, generally averaging about 20 inches per annum, and therefore it may be said that on its irrigation scheme largely depends the success of its dairying. It has been determined by experiments carried out elsewhere that to produce a ton of dried lucerne hay 7 acre-inches of water has actually to pass through the growing lucerne crop, therefore heavy yields of lucerne hay are only obtainable by the liberal application of water.

Over most of this alluvial ground a fair supply of underground water is obtainable. This is mineralized, particularly in magnesia, and is very acceptable to stock, and is said to be one of the qualities making the Bacchus Marsh lands so recuperative to racehorses, which are sent here regularly to rest between periods of strenuous training.

Forty years ago water was being pumped from the Werribee River to irrigate lucerne. Later on a Water Trust was formed to bring, by gravitation, sufficient water for irrigation, and, in addition, to arrange for supplies for domestic purposes being pumped direct from the river. The present water supply is a gravitation scheme, both for irrigation and household purposes, and is controlled by the State Rivers Commission, which has erected a large weir on the Pike's Creek, near Ballan. This has a holding capacity of 14,850 acre-feet of water, and as the area of irrigable land at Bacchus Marsh is about 3,200 acres, it would require an exceptionally long period of drought to seriously interfere with the lucerne growing.

Lucerne is one of the very best milk-producing fodders, and, being also one of the hardest, as well as one of the most prolific, crops in cultivation, it is rather surprising that it is not more generally grown by dairy farmers. No doubt irrigation greatly increases the growth of this crop; but a lot of feed can be cut from a lucerne paddock throughout the year even without any artificial watering.

Several views of the district are given here, showing the extent to which lucerne is grown around Bacchus Marsh. Every crop illustrated is lucerne, and on all the flat land seen in the pictures this is the crop



View of Bacchus Marsh from Henry Vallence's Hill—looking from south to north.

cultivated, and in nearly all the orchards lucerne is to be found growing between the rows of trees. The view on this page is from Henry Vallence's hill, and is the one first seen from the train approaching from Melbourne. Away in the central background lies Messrs. Miller Bros.' "Broadlands" farm, and to the right are other farms owned by this firm, all worked by families on the contract system. Closer views of "Broadlands" lucerne are shown on the next page. A view of the township from Grant's Hill will reveal to the visitor that a fair amount of this valuable flat land is covered with farm buildings, shops, and residences; but everywhere amongst them lucerne and irrigation channels are to be seen. With few exceptions, the blocks are all under irrigation from the open channels. In the case of some of the smaller township blocks, where the water is laid on from the township reticulation, irrigation is carried on by means of the ordinary hose and spray.

The general method of watering, however, in the past, was to distribute the water from the open channels by means of long lengths of large hosing made of strong calico or duck; but this system is being

superseded by that of flooding the new well-graded lands between the check banks.

A picture taken at Vallence's corner, in the Main-street, and shown on page 299 is of more than passing interest. The acre-block of lucerne in the foreground, showing such splendid growth, is without



A Portion of "Broadlands."

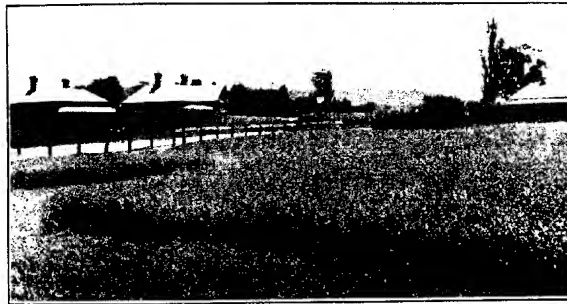


"Broadlands" No. 3 Farm.

direct irrigation of any kind, being maintained in its luxuriant condition possibly either by underground spring or soakage. Carefully managed paddocks in the Bacchus Marsh district usually produce from five to six tons of dried lucerne hay to the acre each year, the life of the "stand" varying according to the treatment the paddock receives and, in some instances, to its situation. Occasional lucerne paddocks here have produced fair crops for nearly forty years; but such cases are

care. About the sixth year the plants begin to thin out, and from seven to ten years is now regarded as the commercial life of a lucerne paddock, after which it requires replanting. In some paddocks, after a few years' growth, prairie grass makes its appearance, and in other cases clover will grow with such vigour as to almost crowd out the lucerne. As each paddock requires replanting, it is ploughed and re-graded, and a crop of maize or millet, &c., is also usually taken off before the land is finally prepared for the new sowing of lucerne. Cultivation and manuring of the growing lucerne has, so far, not been extensively practised.

Drainage troubles—to any definite extent—have never afflicted the irrigator in this favoured locality, these deep alluvial soils seeming eminently adapted to the purpose for which they are being used. Even if a paddock is accidentally flooded with feet of water, practically no harm is caused either to the land or the lucerne, the surplus water being carried off almost at once by the natural underground drainage. Those who have observed the district exhibit at the Melbourne Royal Show



Vallence's Corner, Main-street, Bacchus Marsh.

each year will know that Bacchus Marsh can make a very comprehensive display of products; but it is principally by virtue of its dairying industry that the steady progress and consistent prosperity, which has always distinguished the district, has been established.

The first factory here to handle milk products of any kind was opened for cheese making, about the year 1875, by the late Mr. G. G. Peirce. This was situated at the lower, or south-east, end of the Marsh, and about three miles from the business centre of the present township. The plant was afterwards removed into the township, and, later on, one of the first cream separators to arrive in the district was also installed there, in order that butter as well as cheese might be manufactured. After being carried on as a combined butter and cheese factory for a few years, the building was destroyed by fire, and was not rebuilt, Bacchus Marsh being left without a dairy produce factory of any kind. The making of the butter and cheese was done for some years on the farms, and it was not until 1890 that the Bacchus Marsh Concentrated Milk Company was formed. This company's first plant was erected

on the present factory site at the bridge over the Werribee River, in Grant-street. A picture showing one of the modern concrete irrigation channels, with lucerne crop adjoining, which is reproduced hereunder, was taken from this bridge.

In 1893, Mr. Thos. Anderson built a factory, and manufactured butter here for about five years, and he then also started concentrating milk, both for local and export trade. This business had a successful career, but was eventually bought out by the Bacchus Marsh Concentrated Milk Company in 1909, and its milk supply was transferred to, and treated at, the factory at the bridge.

The Dairymen's Co-operative Association was formed in 1911, and commenced operations in a new factory, off Main-street, with a supply of 5,000 gallons of milk a day, which at first was separated and the cream manufactured into butter. After operating for a few months as



A View, looking east, from Grant-street.

a butter factory, a demand set in from Melbourne for fresh pasteurised milk and table cream, and it was not long before over 2,000 gallons of pasteurised fresh milk, in addition to a quantity of cream, were being sent away daily for the city retail trade. This continued for about four years, when the Federal Milk Company was formed, and arrangements made for the purchase of all the milk the Dairymen's Co-operative Association could supply, and this company erected their present commodious factory as an extension of the Co-operative plant.

The whole of the milk produced locally is purchased by these factories on its butter fat basis, the price ranging from 5d. to 6d. per lb. over top butter factory rates, which is really equivalent to a trifle over 2d. per gallon for the skimmed milk over and above the market price of the butter fat it contained.

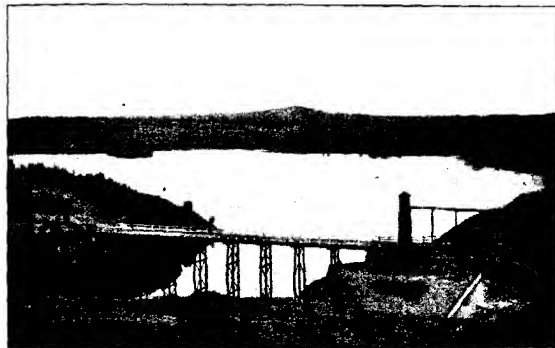
The manufactured products of these factories at present consist of concentrated milk—both in bulk and small tins—pasteurised table

cream, sweetened condensed milk in bulk, as well as in small tins, to suit both export and local trade.

There are at present 196 dairy farmers in the Bacchus Marsh district, milking approximately 3,500 cows, supplying the whole of their fresh milk to the local factories; but milk is also sent to these factories by rail from Ballan and Melton. Until about six months ago a large quantity of milk was also being received by road from Myrmiong, but a branch factory of the Federal Company has now been erected there for the treatment of local milk supplies.

One very important requirement in connexion with the condensing and concentrating business is that the milk can only be satisfactorily treated if it be clean and fresh, and, to insure these conditions, delivery at the factories is taken twice a day during the summer months.

An outstanding feature of the district is the regularity of its milk supply, there not being that noticeable seasonal variation in quantity which prevails in most places where factories and creameries are

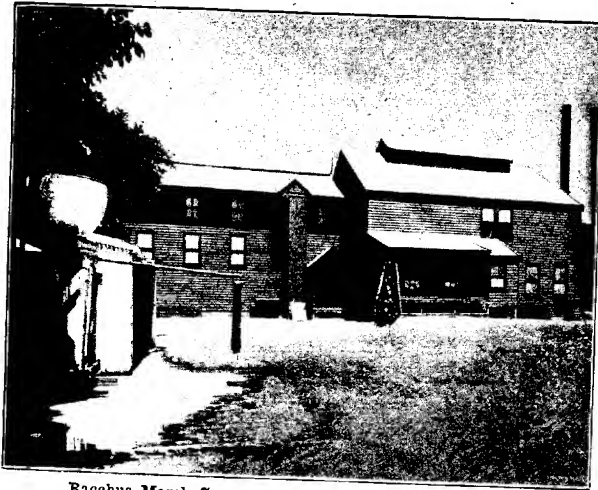


Pyke's Creek Reservoir, Bacchus Marsh.

operating. This is chiefly due to the almost uniform system which obtains here of hand-feeding the cattle practically the whole year round, while this is possibly assisted to a considerable extent by the sheltered situation of the farms and the exceptionally mild winters usually experienced in the district.

In order that dairying on valuable land like this may justify itself, all wasteful methods must be eliminated. The soil must be made to produce a large amount of fodder in order that a maximum production of milk may be obtained from the cows; hence the methods adopted differ somewhat from those followed in most of the other dairying districts of the State. On many of the dairy farms here practically all the feed consumed by the cows is cut and fed to them. Dairymen elsewhere may be inclined to doubt that herds up to 40 cows can thus be probably hand-fed, but on several of these Bacchus Marsh farms the cows are regularly fed in the stalls at midday, as well as in the morning and evening. Of course, the chief fodder supplied them is lucerne,

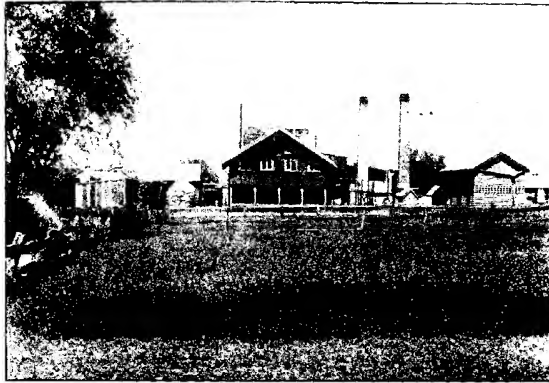
either in its green state, freshly cut from the paddocks, or as hay or bay chaff, varied a little with green maize, or, in some cases, millet, mangolds, &c. Lucerne paddocks which are almost "run out," and require renewing, are the only ones on which the cows are grazed. In some instances these paddocks contain, besides lucerne, more or less white and strawberry clovers, and prairie, and other grasses, which together form an ideal grazing mixture. But even in grazing cows in such pastures as these, care has to be exercised, owing to the danger of the lucerne "bloating" the cows. The land, however, is too valuable for any quantity of it to be used long as a grazing paddock, and usually after one season's grazing it is then prepared for another planting of lucerne.



Bacchus Marsh Concentrated Milk Company's Factory.

As in most other districts, the class of dairy cow most favoured here varies according to individual opinion, but the general preference leans generally towards big-framed cows, showing a fair amount of Shorthorn blood. This tendency may largely be accounted for by the fact that there are either within the district, or reasonably close to it, about a dozen properties whose owners are engaged in breeding high class Shorthorn cattle, and included amongst them are studs containing some of the best Shorthorn blood in the Commonwealth. Ayrshires are also well represented, and some nice herds of these cattle are to be found; but most other breeds seem to be almost overlooked, for only a few Jerseys are to be seen, and on one property alone a few Holsteins have been recently introduced. Amongst the general run of dairymen the breeding or appearance of any cow is not considered of very great importance as long as she is a good performer, and capable of turning large quantities of lucerne into a big flow of milk.

The rich soil, permanent water supply, and favorable climatic conditions which characterize the Bacchus Marsh district make dairy farming profitable, as is shown by the fact that returns for milk supplied to a local factory have frequently averaged £26 per cow. Even at present there is a demand by the factories for more, and still more, milk, and with the prospects of shipping facilities soon becoming something like normal, the world's markets will again be open to Bacchus Marsh products, consequently there is every likelihood of payable prices being maintained.



Federal Milk Company's Factory, Bacchus Marsh.

With its numerous advantages, it may safely be stated that there is no district in Victoria wherein the dairying industry has become more profitable to the producer than in Bacchus Marsh, and supporting it all is the system of continuous feeding. Every dairy farmer grows abundance of feed for his cows, for he knows that good feeding will yield the best results. A good dairy cow that is not well fed will not be fully profitable. The better the cow, the higher the profit; but there is little profit in any dairy cow without good feeding.

THE farmer who uses the swill pail for feeding calves, or who hangs the pail on a post between feedings without washing it, will soon be looking for a cure for calf scours. The dirty calf pail is one of the chief causes of scours. In the fly season and warm weather extra precautions must be taken in caring for the calf pails. They should be washed thoroughly after each feed, and sterilized either with steam or hot water. After the pails have been sterilized they should be inverted in a clean protected place until time to use them again.

A CONTRIBUTION TO THE STUDY OF HEREDITARY UNSOUNDNESS IN HORSES.

By W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.

(Continued from page 695, Vol. XVI.)

[The system of numbering that has been adopted in the tables is to give a number to the foundation member, 1, 2, 3, &c., and to use decimal points for the subsequent generations, 1.1, 1.2, 1.3 representing the first, second, and third son of 1 respectively. This arrangement does not refer to order of birth, but merely to first, second, or third son recorded, and so on. Another figure is used in the next generation, 1.39 representing the ninth recorded son of the third recorded son of the founder 1. When over nine sons are dealt with, the cypher 0 is used in front of the unit of that generation, and represents 9, thus 1.04 is the thirteenth, and 1.0004 is the thirty-first ($9+9+9+4$). Each of these refers to the first generation; the number of noughts preceding a unit being counted with the unit. In this way the numbers 1.002, 1.6, 0.03 shows four generations from founder 1, and, reading backward, we get twenty-first son of sixth son of first son of twentieth son of 1. (The commas are introduced to show the meaning clearly.)]

FAMILY 8.

Only 56 members of this family have been examined, and seven, or 12.3 per cent. were found unsound. The whole of the unsoundness runs through 8.1, as shown in the following analysis of the family:—

Sires.	Sons.			G Sons.			GG Sons.			GGG Sons.			Totals.		
	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.
8.1 ..	12	1	50	14	1	7.1	13	4	30.7	5	1	20.0	34	7	20.5
8.2 ..	..	..	..	7	..	..	..	..	..	..	..	..	12	..	..
8.3 ..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
8.4 ..	..	..	..	1	..	..	..	..	..	..	..	..	6	..	..
8.5 ..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..
Totals ..	2	1	50	24	1	4.1	25	4	16.0	5	1	20	56	7	12.5

Thirty-four descendants of 8.1 were examined, and seven, or 20 per cent., were found unsound. Unfortunately the pedigrees of a great number do not trace through the female side to sires recorded in these tables, and the unsound representatives are amongst these. But from the facts which can be gathered, it is apparent that by mating with sound mares the unsoundness has become a diminishing factor.

8.11 was undoubtedly unsound, yet six of his progeny were sound when examined at five years of age or over—in all eleven sons were sound, and only one unsound.

An effort has been made to find the relation of the dams of the sound animals to sires in these tables, with the following results:—

8.111 was from a mare by 4.1261, a member of the sound family 4, though with a taint of unsoundness.

8.113 was from a mare by 2.1, of sound family, and mares by him were much sought after.

8.116 was from a mare by 3.711; only one of his sons was examined; he was sound.

8.118 was from a mare by 2.1032; sound as a ten-year-old, and of sound family.

8.1102 was from a mare by 6.1; a sound family.

It would, therefore, appear that the influence of a sound dam has had greater effect than that of the unsound sire 8.11, which probably inherited his unsoundness from 8.1, or from his own dam, and not from the founder of the family 8, otherwise unsoundness would have almost certainly appeared through some of the progeny of his other sons. Of course, the limited number examined, and the immature age of some must not be lost sight of, for, as previously pointed out, the fact that unsoundness has not been detected is not conclusive proof of soundness for all time in the blood.

FAMILY 8.

8-1, not examined	8-11, ringbone, 4	8-111, sound, 3 8-112, sound D.A.P., 3 8-113, sound, 5 8-114, sound, 5 8-115, sound, 5 8-116, sound, 3 8-117, sound, 5 8-118, sound D.A.P., 5 8-119, sound, 5 8-1102, sound, 3 8-1103, sound, 4 8-1101, ringbone, 3	8-1162, sound, 4 8-1161, sound D.A.P., 4	
	8-12, not examined	8-121, sound, 7 8-122, not examined 8-123, sound, 3 8-124, not examined	8-1221, sound, 5 8-1222, sound, 4 8-1223, sound, 5 8-1224, sound, 4 8-1225, sound, 3 8-1231, sound D.A.P., 5 8-1232, sidebone, 4 8-1241, ringbone, 5 8-1242, sidebone, 5	8-12421, sound, 4 8-12422, sound, 3 8-12423, sound D.A.P., 3 8-12422, sound D.A.P., 3 8-12424, sidebone, 3
	8-13, sound, 4	8-125, not examined	8-1252, sound, 3 8-1251, ringbone, 3	
8-2, not examined	8-21, not examined	8-211, sound, 4	8-2111, sound, 4 8-2112, sound, 2 8-2113, sound, 2 8-2114, sound, 3	
	8-22, not examined	8-221, sound, 3 8-222, sound, 3 8-223, sound, 8		
	8-23, not examined	8-231, sound, 5 8-232, not examined 8-233, sound, 5 8-231, sound, 4	8-2321, sound, 4	
8-3, not examined	8-31, not examined	8-311, not examined	8-3111, sound, 5 8-3112, sound, 3	
	8-32, not examined	8-321, sound, 5		
8-4, not examined	8-41, not examined	8-411, sound, 7	8-4112, sound, 5 8-4113, sound, 3 8-4114, sound, 3 8-4115, sound, 5 8-4111, sound D.A.P., 6	
8-5, not examined	8-51, not examined	8-511, sound, 3		

FAMILY 9.

This family has been referred to on numerous occasions as being the probable source from which unsoundness has been transmitted to sound lines through the dams. One hundred and ninety-five descendants have been examined, and 45, or 23 per cent., found to be unsound. Most of this unsoundness is found in the branch with 9.3 at the head.

The table for the whole family is as follows:—

Sires.	Sons.			G Sons.			GG Sons.			GGG Sons.			GGGG Sons.			GGGGG Sons.			Total.		
	Examined.			Examined.			Examined.			Examined.			Examined.			Examined.			Examined.		
	Unsound.	Percentage.		Unsound.	Percentage.		Unsound.	Percentage.		Unsound.	Percentage.		Unsound.	Percentage.		Unsound.	Percentage.		Unsound.	Percentage.	
9.1	10	2	20	..	22	3	13.6	..	..	..	1	1	100	..	..	..	33	6	18.2
9.2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..
9.3	7	5	71.4	..	33	7	21.2	33	10	30.3	33	3	9.1	..	..	..	107	27	25.3
9.4	1	..	..	..	1	100	..	..	..	..	..	..	..	..	..	..	1	1	100
9.5	1	..	..	..	22	7	25.9	13	12	15.3	8	1	12.5	..	..	..	49	10	20.4
9.6	2	1	50	..	..	..	..	..	..	..	..	..	2	1	50.0
Totals	2	..	20	8	40.0	..	84	18	21.4	46	12	26.0	42	7	16.6	1	..	..	195	45	23.0

Although 18 per cent. of the progeny of 9.1 is recorded as unsound, it must be remembered that only a few representatives, viz., 33, have been examined—ten were grandsons, and of these two were unsound; 22 were great grandsons, and three were unsound. A large number were mature at time of examination, so we may consider the branch a sound one, or, at any rate, one in which the factor for unsoundness is diminishing, and only appearing when mated with unsound females. In support of this it may be pointed out that the dam of 9.1215 was by 3.1. Seventy-five per cent. of the sons of 3.1 showed unsoundness; 40 per cent. of his grandsons were unsound, and 31 per cent. and 50 per cent. of his great grandsons and great-great grandsons respectively. Further, the dam of 9.127 was by 4.13, a member of an unsound branch, which has been noted on previous occasions as the possible source of unsoundness. Two sons of 9.11 were examined; they were both sound. This horse was referred to in the first part of this article as being responsible for the introduction of soundness into the very unsound family 16.

Through the branch with 9.3 at the head there is a large amount of unsoundness. This stallion was not examined, but 71 per cent. of his sons was affected with sidebone, and many mares by him are known to be affected.

It is interesting to follow the family of one of his sons, viz., 9.312. himself not examined. Fourteen sons of this horse were examined, and only one was found unsound. Most of the sound animals were of mature age at examination; therefore it would appear that here we have a sound branch of an unsound line to consider, and that the soundness has been introduced into it. This can be shown to have occurred through 9.312. which was from a mare by 7.4, a horse already referred to as being

sound, consequently soundness appears dominant in his progeny. Following the line through 9.3127, we find that fifteen of his sons, *i.e.*, grandsons of 9.312, were examined, and that seven of them, or 60 per cent., were unsound, and as most of the sound ones were not of mature age, unsoundness is the predominant factor in this generation. 9.3127 was not examined, and he may have been unsound; it is more than likely that he was, for he is carrying the unsound blood of 9.31, and was from a mare by 38, previously referred to as appearing frequently in unsound pedigrees. Therefore we may assume that the combination of blood has caused unsoundness to prevail in this progeny. Only one in the generation was aged and sound at examination, *viz.*, 9.312705, and as he was from a mare by 7.41 of very sound line, the factor for soundness would again become dominant.

Through the branch 9.5, 20 per cent. unsoundness is shown. All of this is in the progeny of 9.51, which was from a mare by 1—the sire of an unsound family. A considerable amount of the unsoundness is counteracted through 9.512, which was by 2.5. of sound blood, and so mature sons are found sound, but when again meeting unsound blood, as did 9.5122, whose granddam was by 3 and 9.5127, whose dam was 9.3102, the factor predominates, and unsoundness results.

9.52 appears as a sound line, but, as the pedigree of the dams cannot be traced, it is impossible to say in which generation soundness appeared.

FAMILY 9.

9-1	9-11, not examined	9-111, sound, 6	9-1213, sound, 5		
	9-12, not examined	9-112, sound, 4	9-1214, sound, 4		
		9-121, not examined	9-1216, sound, 5		
			9-1217, sound, 3		
			9-1218, sound, 5		
			9-1219, sound, 5		
			9-12101, sound, 3		
			9-12102, sound, 3		
			9-12103, sound, 3		
			9-12105, sound, 4		
			9-12106, sound, 3		
			9-12107, sound, 3		
			9-12108, sound, 3		
			9-12109, sound, 4		
			9-1211, <i>sidebone</i> , 3		
			9-1212, <i>sidebone</i> , 3		
			9-1215, <i>sidebone</i> , 4		
			1-12104, sound		
			D.A.P., 3		
		9-122, sound, 3			
		9-123, sound, 4			
		9-124, sound, 3			
		9-125, sound, 6			
		9-126, sound, 2			
		9-128, sound, 5			
		9-1201, not examined	9-12011, sound, 4		
		9-1202, not examined	9-12012, sound, 3		
		9-1203, not examined	9-12021, sound, 4		
		9-127, <i>sidebone</i> , 4	9-12031, sound, 4		
		9-128, <i>ringbone</i> , 6			
		9-1204, not examined	9-12041, not examined	9-120411, not examined	9-1204111, <i>sidebone</i>
9-2, not examined	9-21, sound	9-211, sound, 5			
	D.A.P., a				
	9-22, sound, a				

Family 9—continued.

9-311, not examined	9-311, not examined	9-311, not examined	9-311, not examined	9-3111, not examined	9-31111, sound, 4 9-31113, not examined	9-31113, sound, 5
					9-31115, sound, 4 9-31116, sound, 5 9-31117, <i>sidebone</i> , 6 9-31114, sound	
					D.A.P., 6	
		9-312, not examined	9-3122, not examined	9-3122, not examined	9-31222, bog spavin and curb, 3 9-31221, sound	
				9-3123, not examined	D.A.P., 3	
				9-3125, sound, 5	9-31231, sound, 3	
				9-3126, sound, 5	9-31251, sound	
				9-3127, not examined	D.A.P., 4	
					9-31275, sound, 3 9-31276, sound, 5 9-31277, sound, 3 9-31278, sound, 3	9-312781, sound, 3 9-312782, sound, 3
					9-312705, sound, a 9-312706, sound, 3 9-312707, sound, 3	9-3127071, sound, 3 9-312791, sound, 5 9-312792, sound, 3
					9-31279, sound, 5	9-312793, <i>sidebone</i> , 3
					9-31272, <i>sidebone</i> , 7	9-312723, sound, 2 9-312724, sound, 5 9-312725, sound, 4 9-312722, sound
						D.A.P., 3 9-312726, sound D.A.P., 3 9-312721, <i>sidebone</i> , 4
					9-312701, <i>sidebone</i> , 5 9-312702, <i>sidebone</i> , 5 9-312703, <i>sidebone</i> , 7 9-312704, <i>sidebone</i> , 4 9-31273, <i>sidebone</i> , 3 9-31274, <i>sidebone</i> , 4	9-312731, sound, 2 9-312741, <i>sidebone</i> , 2
				9-3128, sound, 3 9-3129, sound, 3 9-31203, sound, 4 9-31204, sound, 3 9-31205, sound, 3 9-31207, sound, 5 9-31208, sound, 5 9-31209, sound, 6 9-3121, sound		
					D.A.P., 6 9-3124, sound D.A.P., 3 9-31206, sound D.A.P., 4 9-31202, <i>sidebone</i> , a	
		9-313, <i>sidebone</i>				
		9-314, bog spavin, 9			9-3141, sound, 8 9-3142, sound, 5 9-3143, sound, 5	
		9-315, not examined		9-3151, <i>sidebone</i> , 5		
		9-316, not examined		9-3161, sound D.A.P., 5 9-3162, sound D.A.P., 3		
		9-317, not examined		9-3172, sound, 5 9-3171, sound D.A.P., a		
		9-318, not examined		9-3181, sound D.A.P., 6		
		9-319, not examined		9-3191, not examined 9-3192, not examined 9-3193, sound, 5 9-3194, <i>sidebone</i> , 8	9-31911, sound, 5 9-31912, sound, 4 9-31921, sound D.A.P., 4 9-31931, sound, 3 9-31941, sound D.A.P., 4 9-31943, sound, 4 9-31942, <i>sidebone</i> , 4	

9-3, not examined -contd.	9-31, not examined -contd.	9-3101, not examined	9-3101, sound, a	9-31012, not examined	9-310121, side-bone, 6 9-310122, not examined	9-3101221, sound, 4 9-3101222, sound, 4 9-3101225, sound, 3 9-3101226, sound, 5 9-3101227, sound, 3 9-3101228, sound, 6 9-31012201, sound, 5 9-31012202, sound, 5 9-31012203, sound, 4 9-31012204, sound, 2 9-31012205, sound, 2 9-3101229, sound D.A.P., 3 9-3101224, sound D.A.P., 3 9-3101227, sound D.A.P., 3 9-3101229, side-bone, 5 9-3101231, sound D.A.P., 2 9-3101232, side-bone, 4	9-310123, not examined	9-310124, not examined	9-3101241, sound, 4	9-3101241, sound, 2	
9-4, not examined 9-5, not examined	9-41, not examined 9-51, not examined	9-3102, not examined	9-31022, sound, a 9-31024, sound, 5 9-31021, side-bone, 6 9-31023, side-bone, ringbone, a 9-31025, side-bone, 7 9-31032, side-bone, 5 9-31031, sound, 8	9-3103, side-bone, a	9-3104, side-bone, 1 9-3106, side-bone, a 9-3107, side-bone, a 9-3104, bog 9-411, sidebone, a	9-511, not examined	9-5112, sound, 4 9-5111, sidebone, ringbone, a 9-5113, sidebone, ringbone, a	9-51131, sidebone, 4 9-51132, sound, 4 9-51133, sound, 5 9-51134, not examined	9-51131, sound, 5	9-512, not examined	9-5121, sound D.A.P., 3 9-51291, sound, 6 9-51201, not examined 9-5122, side-bone, 8 9-5127, side-bone, 6 9-5125, ringbone, 4

Family 9—continued.

9-5, not examined—contd.	9-51, not examined—contd.	9-513, not examined	9-5131, sound, 6	9-51321, sound, 4	9-51322, sound, 5
			9-5132, sound, a	9-51322, sound, 5	9-51322, sound, 5
			9-5133, sound, 3		9-513224, sound, 2
			9-5134, sound, a		9-513228, sound
			9-5135, sound, a		D.A.P., 3
				9-51351, sound	9-513225, sound
				D.A.P., 5	D.A.P., 3
				9-51352, sound	9-513221, side-bone, 3
				D.A.P., 5	
		9-514, not examined	9-5141, side-bone, 10	9-51411, side-bone, 5	
		9-515, sound, 5	9-5151, sound, a		
		9-516, not examined	9-5161, side-bone, 5		
9-52, not examined		9-521, not examined	9-5211, sound, a		
			9-5212, sound, 5		
			9-5213, sound, a		
			9-5216, sound, 3		
			9-5214, sound		
			D.A.P., a		
			9-5215, sound		
			D.A.P., 5		
		9-522, not examined	9-5221, not examined	9-52211, sound, 6	9-52211, sound
				9-52212, sound, 4	D.A.P., 3
					9-52212, sound, 4
9-53, not examined		9-531, sound			
		D.A.P., a			
9-6, not examined	9-61, not examined	9-611, not examined	9-6111, sound, 1		
9-62, not examined	9-621, not examined	9-6211, sidebone, a			

(To be continued.)

ENSILAGE CHUTE.

Instead of leaving portholes in the walls of the silo, a farmer has devised an ingenious chute for sending the silage to the ground. Plans of this chute are shown on the opposite page. The objection to the porthole is that it is necessary to dig down to each one to open it, and the first material sent down must be that nearest to the opening. In the other method an opening (Fig. 1) is left in the wall at the ground level, about 3 feet high and 2 feet wide. From the top of this runs the chute on the inside of the wall to the top, hanging from the top of the wall by a stout iron band, bolted to the back of the chute. This chute has for sides two long 6-in. boards (8-in. would be better), nailed to a back of stout galvanized iron. The width of the opening is 15 inches, but could, with profit, be increased to 18 inches. The open front (Fig. 2) is closed by short boards, lightly nailed on, as the filling proceeds, being held in position by the pressure of the silage. The silage is taken from round the edges of the silo first, is thrown with a broad, square-mouthed grain shovel against the back of the chute, and rapidly falls to the bottom, whence a truck takes it to the mixing

door. As the surface of the material descends, the short boards are taken from the front of the chute, so that there is no lift at any time in emptying the silo.—*South African Farmers' Advocate*.

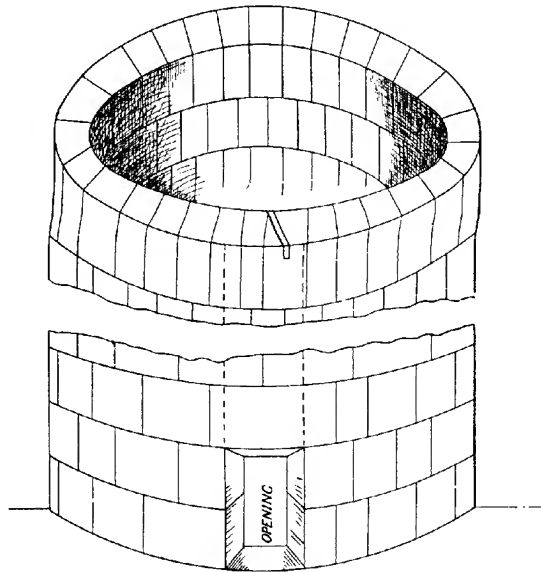


FIG. 1

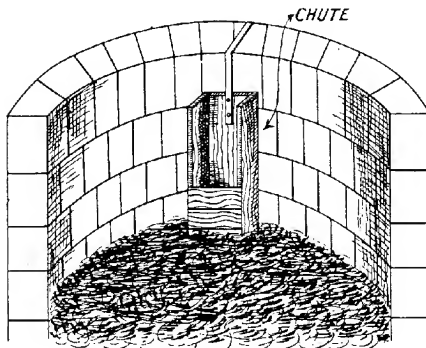


FIG. 2

Plans for an Ensilage Chute.

ARMY AGRICULTURE.

The following extracts from an article contributed to the *Journal* of the Board of Agriculture (England) by the Army Agricultural Committee will, doubtless, be of interest to Australian readers, particularly as Australian soldiers took part in the work referred to. The article was published last November, and was, of course, written before the cessation of hostilities:—

Speaking generally, three years ago there was no such thing as Army Agriculture. In 1915 a little flower garden was to be found here and there, and white wash helped to smarten a camp. A year later the growth of small vegetables and relishes was begun; one officer boasts that he has grown his own mustard and cress for two years! It was not until 1917, when a national shortage of food was threatened, that the Army began to bestir itself; then, too, it was gradually recognised what a large quantity of good land had been appropriated for military purposes. Through the winter of 1917 many units proceeded to break up plots, small and large, with the co-operation of the Director-General of Lands. At the same time, encouraged by the Director of Supplies and Transport, schemes were initiated for cultivations in France, Egypt, Salonica, and Mesopotamia.

By January, 1918, Army cultivations had assumed such large proportions that the Army Council decided to appoint a Committee to co-ordinate and help with the work. On 16th March, 1918, an Army Council Instruction was issued impressing upon all ranks the need of increasing the supply of food and of growing it where it will be consumed, thereby reducing transport. Every opportunity should be taken, the order said, to cultivate lands in and adjacent to barracks, camps, command depôts, and hospitals. The War Office has provided money for initial expenses where required, and Army manure free when locally available. Some additional labour, to supplement the work done by men in their spare time, has been found, from the Labour Corps, Non-combatant Corps, and prisoners of war.

The two main objects of the Army Agricultural Committee at Home are to prevent the waste of the large acreage of agriculturally valuable land now in the occupation of troops, and as far as possible to make the Army self-supporting in potatoes and other vegetables. With regard to the prevention of waste, just over 6,500 acres are to-day being cultivated by the Army in Great Britain and Ireland; this is largely made up of plots of from 2 or 3 to 30 yards square. In some camps every available corner has been tilled between and round the huts; in others, an old parade ground has been dug up by hand, manured, and planted.

In spite of the remarkable results which have been achieved, the aim of Army cultivation to make His Majesty's Forces self-supporting in potatoes and other vegetables is as yet far from being realized. Allowing an average production of horticultural cultivation of 10 tons to the acre, the produce of the 6,500 acres now under cultivation will suffice to supply not more than 300,000 men with the full Army ration of fresh vegetables. In this connexion it is interesting to note that the Armies in France are producing more than half the quantity of potatoes

and vegetables (100 tons a day) that are being raised by the Forces at Home. Having regard to the difficulties under which the Army carries on its cultivation, these achievements are of no mean order, and the value of the work done is to be measured, not only by the quantity of produce raised, but also by the effect of supplies of fresh vegetables on health. For, as is well known, these foods are Nature's chief preventive medicine against such diseases of malnutrition as scurvy.

It is a curious coincidence that the rate of increase in the acreage under Army cultivation during the past two years has been almost identical with the rate of increase of small cultivation by the civilian population in this country.

The assistance rendered by the Food Production Department to the Army in all this work cannot be over-estimated, and sincere thanks are due to the officials of that Department, who have been indefatigable in their co-operation.

EXAMPLES OF SUCCESSFUL WORK.—Three examples—of many which might be given—may be chosen to illustrate the work which is being done by units.

(1) An officer of the Army Ordnance Corps has 20 men under him: he has rented 1 acre adjoining his camp, and has more than enough vegetables to feed all his men for the year; he has been growing potatoes, carrots, onions, broad beans, dwarf beans, runner beans, beet, cabbage, cauliflower, broccoli, Brussels sprouts, savoy, kale, shallots, leek, pea, turnip, radish, lettuce, marrow, and tomato.

(2) At a very large hutted camp in the North of England, every small plot between and around the huts has been dug up and planted, mostly with potatoes. If it is found that one parade ground less would not interfere with training, it is dug up, with pickaxes if necessary. The area of all these plots added together is 200 acres, and, in addition, 250 acres adjoining the camp have been taken over and broken up for food production; a hard-headed Scottish farmer of low medical category manages this considerable farm.

(3) The third case is that of a commanding officer who was also a keen farmer, but found himself on impossible farming land; he, therefore, set to work to make use of the sewage from his camp, and is now growing cabbages on 16 acres of cleverly-irrigated land.

ARMY AGRICULTURE IN THE THEATRES OF WAR.—So much for the agricultural activities of the Army in the British Isles. It is not considered desirable to give detailed figures of cultivated acreage in the different theatres of war, but in each theatre very large schemes have been and are being undertaken, and as food is produced abroad a corresponding amount of valuable tonnage is being saved.

Mesopotamia.—The largest schemes undertaken by the Army are in Mesopotamia, where, by skilful irrigation, very large areas can be put under cultivation and made to yield results far greater and at less cost than anywhere else in the world. It is estimated that 850,000 acres are now under wheat or barley, and this will be increased to 1,500,000 acres in 1919. In 1919, it is estimated that 100,000 tons grain and 150,000 tons bhoosa will be available for the use of the Forces operating in that theatre of war, besides large amounts for the native population.

It is evident that a very great saving of tonnage is thereby effected at a time when such saving is of the utmost importance. Besides these schemes, vegetables are grown on a very large scale for the troops, and dairy farms have also been started.

Palestine.—In the occupied territories in Palestine, which are claimed to have great possibilities, considerable areas will be put under cultivation during the autumn of 1918.

Salonica.—The Forces in Salonica are self-supporting as regards green vegetables, and are growing crops of potatoes, grain, and fodder. The soil of Macedonia is extremely fertile, and a good yield is obtained.

France.—In spite of the fact that it is on the Front in France that the greatest amount of fighting and movement takes place, even here agricultural operations are undertaken which result in a large supply of vegetables, cereals, and fodder. Some 20,000 acres of derelict crops are being harvested this year by the British Armies, alone, off land behind the lines evacuated by the French farmers. In some cases binders have been at work within a mile of the front line. In addition to all this, the supply of vegetables from camp and Army gardens is most satisfactory, and of appreciable assistance to the Supply and Transport Department.

VICTORIAN RAINFALL.

First Quarter, Year 1919.

(Supplied by H. A. Hunt, Commonwealth Meteorologist.)

District.		January.	February.	March.	Quarter.
		Points.	Points.	Points.	Points.
Mallee North ..	District Mean ..	16	260	24	300
	Normal ..	63	82	106	251
	Per cent. above normal ..	..	217	..	20
	„ below „	75	..	77	..
Mallee South ..	District Mean ..	10	257	83	350
	Normal ..	57	88	96	241
	Per cent. above normal ..	..	192	..	45
	„ below „	82	..	14	..
North Wimmera ..	District Mean ..	10	296	113	419
	Normal ..	56	79	97	232
	Per cent. above normal ..	..	275	16	81
	„ below „	82	..	..	..
South Wimmera ..	District Mean ..	13	319	117	449
	Normal ..	80	80	110	270
	Per cent. above normal ..	..	299	6	66
	„ below „	84	..	..	..

VICTORIAN RAINFALL—continued.

District.		January.	February.	March.	Quarter.
		Points.	Points.	Points.	Points.
Lower Northern Country	District Mean ..	4	264	133	401
	Normal ..	85	89	113	287
	Per cent. above normal ..	197	18	40	
	" below " ..	95	..	..	..
Upper Northern Country	District Mean ..	3	281	104	388
	Normal ..	110	100	135	345
	Per cent. above normal ..	181	..	..	12
	" below " ..	97	..	23	..
Lower North-East ..	District Mean ..	2	219	193	414
	Normal ..	152	143	220	515
	Per cent. above normal ..	53	..	..	..
	" below " ..	99	..	12	20
Upper North-East ..	District Mean ..	6	241	310	557
	Normal ..	219	189	280	688
	Per cent. above normal ..	28	11	..	..
	" below " ..	97	..	..	19
East Gippsland ..	District Mean ..	34	259	420	713
	Normal ..	261	222	240	723
	Per cent. above normal ..	17	75	..	..
	" below " ..	87	..	..	2
West Gippsland ..	District Mean ..	53	371	491	885
	Normal ..	224	172	277	673
	Per cent. above normal ..	116	66	32	..
	" below " ..	76	..	..	..
East Central ..	District Mean ..	74	309	562	945
	Normal ..	218	176	273	667
	Per cent. above normal ..	76	106	42	..
	" below " ..	66	..	..	..
West Central ..	District Mean ..	41	356	469	866
	Normal ..	136	133	205	474
	Per cent. above normal ..	168	129	83	..
	" below " ..	70	..	..	..
North Central ..	District Mean ..	12	323	236	571
	Normal ..	135	134	175	444
	Per cent. above normal ..	111	35	29	..
	" below " ..	91	..	..	..
Volcanic Plains ..	District Mean ..	27	327	265	619
	Normal ..	122	118	177	417
	Per cent. above normal ..	177	50	48	..
	" below " ..	78	..	..	..
West Coast ..	District Mean ..	55	334	320	709
	Normal ..	139	126	197	462
	Per cent. above normal ..	165	62	53	..
	" below " ..	60	..	..	..

N.B.—100 points = 1 inch.

WHY FARMERS SHOULD KEEP MILK RECORDS.

In *The Hawaiian Forester and Agriculturist* for January, 1919, Professor Ralph J. Borden gives the following eight reasons for keeping the milk records of the herd at Kamehameha Schools Farm, which, he remarks, apply equally to other herds:—

1. They form the basis upon which the dairy herd is being continually improved. No dairyman can afford to buy a herd bull whose dam does not have an authentic record of milk and butter-fat production. Nor can any dairyman afford to raise calves to maturity unless he has every assurance that they will prove worth raising.
2. They enable the feeder to feed each cow according to the quantity of milk she produces. Present high cost of concentrate feeds makes it necessary that every cow pay in milk production for the feed she consumes.
3. They stimulate better feeding and breeding. The use of a balanced ration is soon evident in the way the cows respond at the pail. The daughters of the best producers usually give proof at an early age of their ability to surpass their dam in milk secretion.
4. Records enable the dairymen to sell cows where other qualities fail. A cow with a record of production is worth 25 per cent. to 50 per cent. more than one without.
5. The weighing of the milk keeps the owner in close touch with the daily condition of the cow. There are many cases of serious illness which could have been prevented in their early stages when the milk record began to drop and give evidence of something wrong with the animal's condition.
6. Records stimulate better milking. They serve as a check on the milker, and induce him to milk more thoroughly than when the milk is not weighed.
7. A knowledge of what each animal is doing develops personal pride and interest in the herd.
8. They make dairying a business proposition and in more ways than one mean more money to the owners.

It takes about a minute a day to weigh and record the milk of each cow, but it is a minute well spent and one which will amply pay for itself. Try it, dairymen, on a few cows, and see how quickly you will appreciate the value of keeping milk records.

ORCHARD AND GARDEN NOTES.

E. F. Percoll, F.L.S., Pomologist.

The Orchard.

CULTIVATION.

Cultivation work should be well on the way by this time. The ploughing should be advanced, so as to leave plenty of time for other orchard work. Autumn ploughing may be rough, but care should be

taken to plough to the trees; so that a drainage furrow is left between the rows.

MANURING.

It is just possible, where heavy crops have been carried, that a top dressing of stable manure will be required to add humus to the soil. The fertility of the soil must be maintained; and, although stable and chemical manures as a general rule are of undoubted value as tree stimulants, well-cultivated and thoroughly tilled land will always carry fair crops with far less manure. Further, if the orchard land is well drained, cultivated, and sub-soiled, any manures that are used will be far more beneficial to the trees. The more suitable the conditions that are given to the trees, the better they can appreciate and assimilate their food.

Perhaps the most useful and valuable of manures is stable manure. It is of great use, not only as a manure and as an introducer of necessary bacteria into the soil, but its value in adding humus to the soil is incalculable. Organic matter, such as stable manure, introduced into the soil quickly becomes humus; this greatly ameliorates and improves soil conditions. It is impossible to say what quantity of stable manure is necessary per acre; that can be determined only by circumstances. Orchards in different climates and varying soils will require differing quantities. A too liberal use of stable manure will be over-stimulating in most cases, and at all times an excess beyond what is necessary for present use will only be waste, as humus is readily lost from the soil, once it is in an available food form.

It has been pointed out in these notes previously that an improved physical condition is far more profitable to the fruit-grower than the continued use of manures. A tree will be far more productive if it is happy in its soil conditions; uncomfortable conditions will always result in unprosperous trees.

A dressing of lime, using about 4 or 5 cwt. per acre, is of great value in stiff or heavy orchard lands; and it may be given at this season. The lime, which must be fresh, should be distributed in small heaps between the trees, covered with a layer of soil, and allowed to remain for a few days before ploughing or harrowing in.

PESTS.

The advice given last month for spraying should be followed, particularly where any oil emulsions or washes are to be used.

Orchards will benefit if an attack is now made upon the Codlin moth. All hiding places, nooks, and crannies, where the larvæ have hidden, should be thoroughly searched and cleaned out. The orchardist has far more time now to do this work than he will have in the spring time.

GENERAL WORK.

Drainage systems should now be extended with as little loss of time as possible.

New planting areas should be prepared, and subsoiled or trenched wherever possible.

Vegetable Garden.

Weeds must be kept down in the vegetable garden. Weeds are generally free growing at this season; their growth is very insidious, and they will crowd out the young seedlings or plants in a very quick time. Hoeing and hand weeding must be resorted to, preferably hoeing. The frequent use of the hoe in winter time is of much benefit in the vegetable garden. A varied assortment of crops is now being produced; and if these can be kept growing much better crops will result. The soil quickly stagnates in the winter, and the only way to prevent this is to keep the surface stirred. Thus, a double service is performed with the aid of the hoe.

The application of lime is of great necessity at this season. In addition to amending unhealthy and unsuitable soil conditions, lime is particularly useful as an insecticide. It assists in destroying in immense numbers both eggs and insects that would breed and live in the ground ready to do damage to all classes of vegetable crops. Therefore, wherever possible, the soil should receive an application of lime. The garden should, as well, be manured with stable manure, but not for some weeks after the lime application.

Cabbage and cauliflower plants may be planted out; and seeds of parsnips, carrots, onions, peas, and broad beans may be sown.

Flower Garden.

The whole flower section should now be thoroughly dug over. All beds should be cleaned up, top-dressed with manure, and well dug. The light rubbish, such as foliage, twiggy growths, weeds, &c., may all be dug in, and they will thus form a useful addition to the soil. These should never be wasted. Only the coarser and stouter growths should be carted away for burning, and then the ashes may be used as manure. No part, whatever, of garden rubbish or litter need be wasted. In one form or another it should be replaced in the soil.

May is a good month for establishing new gardens, and for planting out. All deciduous plants and shrubs may now be planted. It is not necessary to dig a deep hole for planting. A hole in which the roots of the plant can be comfortably arranged, without crowding or cramping, will be quite sufficient for the purpose.

Continue to sow seeds of hardy annuals, including sweet peas, although the main crop of sweet peas should by this time be well above ground. Where there has been any overplanting, the young plants will readily stand transplanting, and this will greatly assist those that are to remain. Annuals should not be crowded in the beds. They require ample room for suitable development, and thus the seeds should be sown thinly or the plants set out a good distance from each other.

All herbaceous perennials that have finished blooming may now be cut down. Included amongst these are phlox, delphiniums, &c. If these are to remain in their present situation for another season it is always an advantage to raise them somewhat, by slightly lifting them with a fork, so that too much water will not settle around the crowns; they may also be mulched with stable manure, or the manure may be forked into the soil around the crowns.

CULTIVATION OF THE PARSNIP BED.

Frequently growers report the failure of parsnip seed to germinate. This may be accounted for by the failure of the seed to retain its vitality. In the Old Country two-year-old seed is considered very unreliable; and in this country care should be taken to obtain fresh seed. Some amateur gardeners take very little care in preparing a seed-bed to insure the necessary depth and a fine tilth. On a rich sandy soil it is easy to fulfil the conditions necessary to insure the germination of the seed. Deep digging prevents curving or forking, and assures a good sample of parsnip. Then, as to manuring: As a rule, no manures should be applied directly to the crop, or forking may result. If a soil is poor, 2 cwt. of farmyard manure per square rod (30½ square yards) dug or ploughed in will be advantageous. As parsnips take a long time to grow, the object of manuring is to supply a sufficiency of fertilizing material available for the whole season of growth.

A writer in the journal of the British Board of Agriculture says that during the working of the land the following artificials should be ploughed or dug in:—4½ lbs. of superphosphate and 5½ lbs. of basic slag per rod, or an equivalent in the form of a mixture of superphosphate and steamed bone-flour, or superphosphate and ground mineral phosphate. Just before sowing the seed, sulphate of ammonia at the rate of ¾ lb. per rod, should be worked into the top soil, and after "singling" a further dressing of sulphate of ammonia at the same rate should be applied.

Parsnips should be sown early in the season, from March to May, at the rate of 6 lbs. to 7 lbs. of seed per acre (1 oz. per rod, or, say, 200 feet of drill), in rows 15 inches to 18 inches apart, about 1 inch deep and lightly covered. In about a month from sowing, when the plants show the true leaf as well as the seed leaf, they should be thinned out to 6 inches to 9 inches apart.—*Journal of Agriculture*, Queensland.

REMINDERS FOR JUNE.

LIVE STOCK.

HORSES.—Those stabled and in regular work should be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Grass-fed working horses should be given hay or straw, if there is no old grass, to counteract the purging effects of the young growth. Old and badly-conditioned horses should be given some boiled barley. Paddocked horses should be looked at from time to time to ascertain if they are doing satisfactorily.

CATTLE.—Cows, if not housed, should be rugged. Rugs should be removed and aired in the daytime when the shade temperature reaches 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. If in low condition feed well to tide them over the period and stimulate milk flow. It should be borne in mind that the cows most liable to milk fever are those that have been low in condition and are rapidly thriving. The treatment described in the *Year-Book of Agriculture*, 1905, should be almost invariably successful. It will generally be found most profitable to have cows calve in autumn. They will then pay well for feeding through the winter, and will flush again with the spring grass. Calves should be provided

with warm dry shed. Cows and heifers for early autumn calving may be put to the bull. Observe strict cleanliness and regularity with regard to temperature and quantity of feed to avoid losses and sickness incidental to calf rearing.

PIGS.—Supply plenty of bedding in well ventilated sties. Sows in fine weather should be given grass or lucerne run. Bulletin on the Pig Industry is now available.

SHEEP.—Clear muck-balls from tails and legs of all sheep. Have the wool cleared from round udders and eyes of all young lambing ewes, and see them first thing every morning. Mark the ram lambs at earliest chance. Cut off ewes with oldest wether lambs to best pasture or fodder crops.

Sheep with overgrown hoofs are unthrifty. Whenever noticed trim back into shape; they cut easily during winter. If left, are conducive to lameness, and even foot rot. In the case of common foot rot, or scald, the feet can be placed in a thick paste made of lime and boiling water. Obstinate cases of long standing may need more drastic remedies, and persistent attention. In all cases pare away all loose portions, and leave the diseased parts clearly exposed.

Foxes are more ravenous during winter months. Sparrows, starlings, and parrots are good bait. Poisoning lambs already killed usually accounts for scavenger foxes only.

Every fox is not a lamb killer. Remove all lambs for two or three nights if at all possible, and birds then will rarely fail to entice Reynard the second or third night.

Powdered strychnine, just sufficient to cover nicely a threepenny-piece, is the usual dose. On the more valuable lambs fix a light tin collar, cut from 2 inches wide at the top of the neck to 3 inches wide below, fastened underneath in one place only, near the breast, with fine wire, and lying open towards the throat, allowing the lamb to both suck and feed. It should be cut as large as possible, yet not large enough to permit of its falling off over the lamb's head. This makes a guard that rarely fails to prevent a fox getting to the main blood vein. Remove the guards when the lambs are about eight weeks old.

POULTRY.—Supplies of shell grit and charcoal should always be available. Sow a mixture of English grass and clover; this not only removes taint in soil but provides excellent green fodder for stock. Where possible, lucerne and silver beet should now be sown for summer feed; liver (cooked) and maize aids to egg production during cold weather. Morning mash should be mixed with liver soup given to the birds warm in a crumbly condition. All yards should be drained to ensure comfort for the birds.

CULTIVATION.

FARM.—Plough potato land. Land to be sown later on with potatoes, mangolds, maize, and millet should be manured and well worked. Sow malting barley and sow cereals. Lift and store mangolds, turnips, &c. Clean out drains and water furrows. Clean up and stack manure in heaps protected from the weather.

ORCHARD.—Finish ploughing; plant young trees; spray with red oil or petroleum for scales, mites, aphids, &c.; carry out drainage system; clean out drains; commence pruning.

VEGETABLE GARDEN.—Prepare beds for crops; cultivate deeply; practise rotation in planting out; renovate asparagus beds; plant out all seedlings; sow radish, peas, broad beans, leeks, spinach, lettuce, carrot, &c.; plant rhubarb.

FLOWER GARDEN.—Continue digging and manuring; dig all weeds and leafy growths; plant out shrubs, roses, &c.; plant rose cuttings; prune deciduous trees and shrubs; sow sweet peas and plant out seedlings.

VINEYARD.—Thoroughly prepare for plantation, land already subsoiled for the purpose. Remember that the freer it is kept from weeds from this forward, the less trouble will there be from cut-worms next spring. Applications for ungrafted resistant rootlings and cuttings must be made before the end of the month—see *Journal* for March. Pruning and ploughing should be actively proceeded with. In northern districts plough to a depth of seven or eight inches. Manures should be applied as early as possible.

Cellar.—Rack all wines which have not been previously dealt with. Fortify sweet wines to full strength.



THE JOURNAL
OF
The Department of Agriculture
OF
VICTORIA.

Vol. XVII. Part 6.

10th June, 1919.

SOME RECENT DEVELOPMENTS IN THE DAIRYING
INDUSTRY OF THE UNITED STATES.

Address given before the Annual Conference of Butter Factory
Managers, Melbourne, May, 1919.

By A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.

During the past twenty years the dairying industry of the United States has made great progress, and the yearly value of its dairy produce is now estimated at £200,000,000.

Though during the period mentioned the total number of cattle in the country has shown no increase, the number of dairy cows has greatly increased, and to-day exceeds 20,000,000.

The profits from dairying have been materially increased during the past decade, partly as a result of the consuming demand of the rapidly increasing population, and partly as the result of increased efficiency of dairy production.

This increased efficiency in dairy production has been brought about by the intensive educational propaganda carried out by well-equipped agricultural colleges and experiment stations in each of the forty-eight States of the Union and the activity of the many associations organized for the advancement of the dairy industry, such as the Herd Improvement Associations, Co-operative Cow Testing Associations, and the numerous Cattle Breeders' Associations throughout the Union.

I wish to confine my remarks to a few features of fundamental importance to all dairy interests, namely (1) recent developments in feeding and breeding of dairy cattle; (2) the work of the Cow Testing Associations; (3) the educational and investigational work done in the United States in the interests of the dairying industry.

FEEDING OF DAIRY CATTLE.

The visitor accustomed to the conditions prevailing in the Australian dairying districts is much impressed by the buildings and plant on the